



## 5 Stakeholder consultation

### 5.1 Overview

During the project design development process and preparation of this EIS, consultation was undertaken with a range of stakeholders including various local and NSW Government agencies and the local community. This chapter describes the consultation undertaken for the project, including information on stakeholder identification, methods of communication, and outcomes of the consultation process.

### 5.2 Stakeholder identification

Three stakeholder groups were identified who may have a direct or indirect interest in the project, and hence were included in the consultation for the project. These broad groups were:

1. Regulatory – local, State and Commonwealth government agencies.
2. Community – neighbouring landholders, the broader Balranald community, Aboriginal stakeholders.
3. Other stakeholders with local interests.

Table 5.1 provides a summary of the stakeholder and consultation objectives for the project.

**Table 5.1 Stakeholders and consultation objectives**

	Stakeholder	Consultation objectives
Regulatory	BSC	Introduce the project, including the project infrastructure layout and project timeline.
	Murray River Council (MRC)	
	DoI-DRE	Address matters raised by each of the listed agencies in correspondence provided with the SEARs, as well as any other matters that arise during consultation.
	Office of Environment and Heritage (OEH)	
	RMS	
	LLS-Western	
	DoI Lands	
	Forestry Corporation NSW	
	Department of Primary Industries (DPI) – Agriculture	
	EPA	
	NSW RFS	



**Table 5.1 Stakeholders and consultation objectives**

	Stakeholder	Consultation objectives
Community	Adjoining landholders including: goFARM Sunraysia Solar Farm Two Pty Ltd Private landholders	Introduce the project, including the project infrastructure layout and project timeline.  Where relevant, request information about on site agricultural operations; aerial spraying; weed and pest management practices; and bushfire protection management measures implemented on adjoining land.  Address any concerns about the project.  Discuss the approval process.  Present the findings of the visual impact assessment and discuss potential mitigation/management measures to address impacts (if required).  Provide an opportunity for stakeholders to raise any concerns about the visual impact of the project.
	Balranald community	Introduce the project, including the project infrastructure layout and project timeline.  Present information on the approval process.  Inform the general public about the appropriate avenues for input into the project.  Determine whether there are any concerns about the project to be addressed in the EIS.
	Aboriginal stakeholders	Introduce the project, including the project infrastructure layout and project timeline.  Consultation regarding the Aboriginal cultural heritage values of the site.
Other stakeholders	Iluka Resources Limited	Introduce the project, including the project infrastructure layout and project timeline.  Determine whether there is any potential for cumulative impacts and/or conflicting land uses.  Address any concerns about the project.
	Civil Aviation Safety Authority (CASA)	Introduce the project, including the project infrastructure layout and project timeline.  Clarify whether there is potential for the Limondale Sun Farm to present a hazard to aviation.
	Air Services Australia	Introduce the project, including the project infrastructure layout and project timeline.  Clarify whether there is potential for the Limondale Sun Farm to impact Air Services Australia's communication, navigation and surveillance equipment or airspace.

### 5.3 Regulatory and industry stakeholders

The methods of engagement with regulatory and industry stakeholders, the purpose of engagement, and outcomes of the consultation, is provided in Table 5.2. Detailed records of consultation are provided in Appendix C.



**Table 5.2 Consultation record and outcomes – regulators and industry stakeholders**

Stakeholder	Method of engagement	Date	Purpose	Outcome/comment
BSC	Presentation at ordinary Council meeting	15/11/2016	General project briefing	Presentation at ordinary Council meeting to provide an introduction to the project.
	Letter	12/01/2017	General project briefing	Letter to provide an introduction to the project, contact details and request opportunity to meet if required, to discuss the project and relevant matters.
	Phone call	2/03/2017	Project update	An update on the project was provided. BSC raised the matter of workforce accommodation, noting that there were a number of potential projects that may require accommodation in the future, including the Sunraysia Solar Farm and goFARM's expanded agricultural operations.
	Site visit	4/04/2017	General project briefing	A BSC officer attended a site visit arranged by DP&E of the Limondale Sun Farm.
DP&E	Meeting	24/02/2017	General update	Meeting to discuss the status of the project and process for lodgement of the EIS.
	Phone calls and email correspondence	Ongoing	General update	Ongoing updates regarding the project status
	Site visit	4/04/2017	General project briefing	DP&E coordinated a site visit with regulatory authorities.
DoI-DRE	Letter	12/01/2017	General project briefing	Letter to provide an introduction to the project, contact details and request opportunity to meet if required, to discuss the project and relevant matters. DoI-DRE confirmed that consultation with the department and Iluka Resources Limited would be required in respect of the mineral tenement EL7626 in the vicinity of the site.
	Phone call	24/02/2017	General update	Update provided regarding status of consultation with Iluka Resources Limited.
	Phone call	13/03/2017	Update on consultation with Iluka Resources Limited	Phone call to provide update on the project and consultation with Iluka Resources Limited in regards to EL7626. A map showing location of EL7626 in relation to the project's development footprint was provided subsequent to the phone discussion, on 14 March.



**Table 5.2 Consultation record and outcomes – regulators and industry stakeholders**

Stakeholder	Method of engagement	Date	Purpose	Outcome/comment
Dol-Lands	Meeting	7/12/2016	General briefing, access through travelling stock reserve	<p>The key objectives of the meeting were to brief Dol-Lands on the Limondale Sun Farm and understand implications of the interactions of the project and the TSR adjacent to the site, through which access is required to connect to the Balranald Substation.</p> <p>Dol-Lands confirmed the following:</p> <p><b>Authorisation of use over Crown land</b></p> <p>Options to authorise transmission line infrastructure over Crown Land include a Crown Lands Licence, or an easement. An easement would be created and registered on the land title through NSW LPI.</p> <p>Dol-Lands specified in its letter dated 7/12/2016 that it will need to consider whether a licence can be issued in respect of the Commonwealth <i>Native Title Act 1993</i>, but indicated that:</p> <ul style="list-style-type: none"> <li>• The process for obtaining a licence involves submitting the relevant application form for a Licence over Crown land, written consent from LLS, a copy of the development application and a Landowner’s Consent Application.</li> <li>• Consent from the NSW Aboriginal Land Council will need to be obtained by Overland prior to a licence being granted due to an unresolved Aboriginal Land Claim which exists over the TSR. It will be Overland’s responsibility to negotiate with the NSW Aboriginal Land Council and obtain consent.</li> <li>• It was noted that any licence granted would be terminated if a Native Title claim was granted over the land.</li> </ul> <p>The process for obtaining an easement involves lodging a written request to Dol-Lands for consideration of the creation of an easement over Crown land. The request should be accompanied by consent from Murray LLS for the creation of the easement, a copy of the development application and a Landowner’s Consent Application.</p> <p>The letter from Dol-Lands specifies that compensation may be payable, and would be advised by Dol-Lands.</p> <p>Consent from the NSW Aboriginal Land Council will need to be obtained by Overland prior to an easement being granted (same process as for a licence).</p> <p><b>Native Title</b></p> <p>Letter correspondence provided at the meeting identifies that there is an active Native Title claim registered over the subject Crown Land (claim reference NC2014/002). Review of the National Native Title Tribunal (NNTT) website indicates that the claim was ‘not accepted for registration’.</p> <p>The letter states that the Department has adopted the position that it <i>will not undertake any dealings with Crown land unless it can be satisfied to a high degree of certainty that Native Title does not exist in the land, except by means of one of the methods provided for under the Commonwealth Native Title Act 1993. Due consideration to whether Native Title affects the subject land before appropriate action (including easements and licencing) can be undertaken by the Department. If the project was to proceed, the Department’s Status Branch will undertake a comprehensive historical search to determine if there is any previous extinguishing tenure. There is no guarantee that the search will be successful.</i></p> <p>It is understood that Dol-Lands will not accept a licence/easement application unless it has given due consideration to Native Title, and satisfied itself that there is a low level of risk. Consideration of Native Title.</p>



**Table 5.2 Consultation record and outcomes – regulators and industry stakeholders**

Stakeholder	Method of engagement	Date	Purpose	Outcome/comment
	Phone calls and email correspondence	3/04/2017	Landowner's consent and use of the TSR	Correspondence was primarily regarding the location of infrastructure within the TSR, and the request for consent from Dol Lands to lodge the development application. A letter granting consent to lodge the development application was issued on 6/04/2017. OVERLAND also sought in principle agreement from Dol Lands for the granting of a licence or easement through the TSR for the transmission line and access road. Consultation in this regard is ongoing.
RMS	Letter and follow up phone discussions	12/01/2017	General project briefing	Letter to provide an introduction to the project, contact details and request opportunity to meet if required, to discuss the project and relevant matters.
	Meeting	31/01/2017	Consider options available for site access	<p>Provided an introduction to the project and discussed site access options for the project. Officer provided advice regarding the proposed site access location near the intersection of Balranald Road and Yanga Way, confirming that:</p> <ul style="list-style-type: none"> <li>The existing chevron signage at the intersection of Balranald Road and Yanga Way was not to be impacted;</li> <li>A four way intersection would not be permitted, with any proposed site access intersection to be offset at least 100 m from the Balranald Road/Yanga Way intersection; and</li> <li>Any access road located adjacent to Yanga Way should avoid contraflow with traffic on Yanga Way, so as to avoid the potential for confusion of motorists travelling on either road.</li> </ul>
	Follow-up email and phone discussions regarding site access	2/02/2017 8/02/2017 3/04/2017 7/04/2017	Clarify requirements for site access options raised during meeting	RMS officer confirmed that, based on a site inspection, the proposed site access road would likely be suitable subject to detailed design and meeting the requirements previously identified by the RMS. A plan of the proposed intersection location and access road was provided to RMS on 7/04/2017 by email; RMS provided in principle agreement to the alignment and intersection location.
OEH	Letter	12/01/2017	General project briefing	<p>Letter to provide an introduction to the project, contact details and request opportunity to meet if required, to discuss the project and relevant matters.</p> <p>No response was received.</p>
	Phone call	12/01/2017	Confirm approach to Aboriginal heritage consultation	A teleconference was held with an OEH officer in relation to the proposed approach to the Aboriginal cultural heritage survey. It was confirmed that consultation in accordance with OEH's <i>Aboriginal cultural heritage consultation requirements for proponents</i> (DECCW 2010) is appropriate for the project.
	Site visit	4/04/2017	General project briefing	An OEH officer attended a site visit arranged by DP&E of the Limondale Sun Farm.
EPA	Letter and follow up phone/email correspondence	12/01/2017	General project briefing	Letter to provide an introduction to the project, contact details and request opportunity to meet if required to discuss the project and relevant matters. Follow up phone correspondence with EPA officer confirmed that EPA did not have any specific matters to raise in relation to the project at this time, and EPA did not see the need for a meeting at this time.



**Table 5.2 Consultation record and outcomes – regulators and industry stakeholders**

Stakeholder	Method of engagement	Date	Purpose	Outcome/comment
Forestry Corporation NSW	Phone call	24/03/2017	General project briefing	Introduction to the project and discussion regarding potential impacts to the timber reserves within the TSR.
	Email correspondence	4/04/2017	General project briefing	Email to provide an introduction to the project, provide a copy of the preliminary environmental assessment and request information on timber reserves within the TSR.
DPI	Letter	12/01/2017	General project briefing	Letter to provide an introduction to the project, contact details and request opportunity to meet if required to discuss the project and relevant matters.  A response was received from a DPI officer from the Agriculture Land Use Planning division indicating a need for further consultation regarding the project.
	Phone call and follow up email correspondence	13/03/2017	Project update and discussion of matters to be addressed in EIS	Follow up phone call to provide an update on the project and discuss matters raised to be addressed in the EIS. DPI raised the follow matters: <ul style="list-style-type: none"> <li>land management during operation – impacts to land previously developed for irrigation (not applicable for the Limondale Sun Farm, management of soil erosion and management of soil resources; and</li> <li>decommissioning management – what is the end land use envisaged, and how will the decommissioning process be managed to achieve the desired outcome.</li> </ul> The EIS will include commitments to prepare relevant management plans to address both land management during operation, and an outline of the decommissioning process taking into account that the life of the project is proposed to be in excess of 30 years.  It was agreed that a meeting with DPI Agriculture was not necessary at this stage.  The DPI officer was also advised of the community information session to be held on 22/23 March 2017 and provided a copy of the community factsheet.
	Site visit	4/04/2017	General project briefing	A DPI officer attended a site visit arranged by DP&E of the Limondale Sun Farm.
LLS-Western	Letter and follow up email correspondence	12/01/2017	General project briefing	Letter to provide an introduction to the project, contact details and request opportunity to meet if required to discuss the project and relevant matters. LLS officer confirmed the need to meet with OVERLAND to discuss impacts to be considered in the EIS.



**Table 5.2 Consultation record and outcomes – regulators and industry stakeholders**

Stakeholder	Method of engagement	Date	Purpose	Outcome/comment
	Meeting	15/03/2017	General project briefing	<p>Meeting to discuss implications of the project on the TSR. The following matters were discussed:</p> <ul style="list-style-type: none"> <li>• LLS has full care and control of the TSR, and advised that it is responsible for issuing permits for uses within the TSR, such as stock watering places for use by landholders. LLS confirmed that the EIS would need to consider whether there would be any material impacts on permitted uses.</li> <li>• LLS noted the EIS would need to acknowledge changes in impacts from agricultural uses to use for energy generation.</li> <li>• Permission for use of the existing road would need to be referred to DoI Lands. It was noted by LLS that the access road also provides access to the TSR.</li> <li>• LLS committed to advise on the location of existing permitted uses within the TSR including apiaries, timber reserves, stock watering places and other applicable uses.</li> <li>• LLS committed to advise on PVPs that could be affected by the project)</li> </ul> <p>Overall, LLS advised that the majority of matters related to the TSR should be dealt with through DoI Lands, who will refer any relevant matters to LLS as needed.</p>
	Email and follow up correspondence	15/03/2017	Request for information about PVPs and proximity to site	LLS Western confirmed that there are no PVPs that would be affected by the project.
CASA	Phone call	10/02/2017	General project briefing	Confirmed that consultation is recommended.
	Letter and follow-up phone correspondence	14/02/2017 17/02/2017	Potential impacts on air traffic and Balranald Airport	<p>Letter to provide an introduction to the project. The outcomes of discussions confirmed that:</p> <ul style="list-style-type: none"> <li>• Limondale Sun Farm is not likely to impact pilots during critical approach phases of flight;</li> <li>• Limondale Sun Farm is not considered to be a hazard to aviation;</li> <li>• recommended that anti-glare coating be applied to the PV solar panels to minimise any residual glare; and</li> <li>• there is no formal requirement for the proposal to be referred to CASA.</li> </ul> <p>A formal response was provided by CASA.</p>
Air Services Australia	Email	10/03/2017	General project briefing	<p>Email to provide an introduction to the project, contact details and opportunity to discuss the project and relevant matters.</p> <p>Consultation with Air Services Australia is ongoing.</p>
Transgrid	Phone and face to face correspondence	Ongoing	Grid connection	Letter dated 8 March 2017 provided by Transgrid to OVERLAND providing support for the project and support for connection infrastructure within Transgrid easement.



## 5.4 Community consultation

### 5.4.1 Project website

A project website was established to provide information on the project, details of the community information sessions, and enable the community to contact OVERLAND and provide feedback through a contact form on the website.

### 5.4.2 Community factsheet

A factsheet was distributed to the residents and businesses within Balranald town on 15 March 2017. The factsheet provided an introduction to the project, and included contact details for OVERLAND, and details of upcoming community sessions to be held in Balranald town on 22 and 23 March 2017. A copy of the factsheet is provided in Appendix C.

### 5.4.3 Correspondence with adjoining landholders and other stakeholders

The outcomes of consultation with adjoining landholders and stakeholders with local interests are summarised in Table 5.3. Copies of correspondence (where relevant) are provided in Appendix C.

**Table 5.3 Consultation records and outcomes – adjoining landholders and other stakeholders**

Stakeholder	Method of engagement	Date	Purpose	Outcome/comment
Sunraysia Solar Farm Two Pty Ltd	Phone and email correspondence	21/03/17	General project briefing	General discussion about the project, and initiation to the community information session.
goFARM	Meeting	9/03/17	Project overview and discuss cumulative and land use impacts	<p>The property 'Maffra', owned by goFARM, is located immediately to the north of the project. The outcomes of discussions confirmed that:</p> <ul style="list-style-type: none"> <li>The property, Maffra, is proposed to be planted over the next five years and will comprise almond and pistachio crops.</li> <li>The sensitive receptor, identified as R1 in this EIS, is located on Maffra. goFARM indicated that there were no concerns regarding visual impacts from this sensitive receptor.</li> <li>goFARM advised that the operations on Maffra may involve up to 70 people developing the crop, and 20 during operations, and that the workforce would be housed within existing accommodation on the property and in town.</li> <li>goFARM indicated that there were no plans for aerial pesticide spraying.</li> </ul>
Brian Nield	Phone correspondence	Ongoing	General project briefing	General discussion about the project.
David Lockhart	Phone correspondence	Ongoing	General project briefing	General discussion about the project.



**Table 5.3** Consultation records and outcomes – adjoining landholders and other stakeholders

Stakeholder	Method of engagement	Date	Purpose	Outcome/comment
Iluka Resources Limited	Meeting	31/01/17	Transmission line infrastructure	Iluka Resources Limited proposes to construct a transmission line connecting to the Balranald Substation. The outcomes of the meeting confirmed that OVERLAND and Iluka Resources Limited would continue to consult with each other regarding the respective placement of their infrastructure so as to avoid land use conflicts and minimise impacts on the surrounding land uses.
	Teleconference	2/03/17	Mineral tenement EL7626	The development footprint overlaps with a mineral tenement, EL7626, held by Iluka Resources Limited.
	Provision of draft agreement	10/04/17	Mineral tenement EL7626	A draft agreement has been provided to Iluka Resources Limited that acknowledges that proposed solar energy generation facility and agrees between Iluka Resources Limited and the proponent that Iluka Resources Limited will not need to undertake exploration or extractive operations within an agreed buffer distance from the solar generation facility.

#### 5.4.4 Balranald community information sessions

Two community information sessions were held in Balranald at the Discovery Cafe on 22 and 23 March, 2017. Sessions were advertised in the Riverine Grazier on 15 March, and the details were included on the factsheet distributed to residents and businesses within Balranald town on 15 March. The sessions provided an opportunity for the community to engage directly with representatives from OVERLAND and EMM about the project. Displays were presented, which contained information about OVERLAND, solar farms and renewable energy generation, in general, as well as specific details about the project and the approval process. The displays presented at the community information sessions are shown in Photographs 5.1 and 5.2. A PV solar panel was also on display to provide attendees with an example of the dominant project infrastructure.

The sessions were held over a total of five hours with 17 people registering their attendance over the two sessions. In addition, a number of other residents also attended the sessions but chose not to record their attendance. Of the 17 registered attendees, seven completed feedback forms. Within the feedback forms, the benefits of the project were identified as:

- generating local employment opportunities;
- beneficial for the environment; and
- potential to generate flow-on effects leading to further developments in the area.



None of the respondents raised concerns about the project, and the general consensus during the sessions was that the project would result in positive impacts for the future of Balranald. One participant raised a question on their feedback form enquiring how project infrastructure is disposed of at the end of a solar farms operational life.

A number of the attendees noted their availability for work and showed interest in providing supplies during the project's construction and operational stages. In addition, two suggestions were provided regarding OVERLAND's ongoing involvement in the Balranald community, namely creating a viewing platform overlooking the Limondale Sun Farm as a potential tourist attraction and working collaboratively with BSC to develop community projects that encourage more people to visit Balranald.

Representatives from EMM and OVERLAND also engaged with staff from the Visitor Information Centre and a number of local businesses including Balranald Pharmacy, Balranald Post Office, Sair's Sports, Balranald Newsagency, Balranald Home Timber and Hardware, Caltex Service Station, Balranald Ex-serviceman's Club, Balranald Pizza and Takeaway, Le Gees Furniture and Manchester, the Balranald Motor Inn and the Balranald Club Motel.



Photograph 5.1 Community information session displays



**Photograph 5.2** Community information session displays

#### **5.4.5 Aboriginal stakeholders**

Aboriginal stakeholders were identified and consulted in accordance with OEH's Aboriginal cultural heritage consultation requirements for proponents (DECCW 2010) and the Draft guidelines for Aboriginal cultural heritage impact assessment and community consultation (DEC 2005). A detailed description of consultation is presented in Appendix E, and discussed in Section 6.3.





## 6 Impact assessment

### 6.1 Introduction

A preliminary assessment of biophysical, social and economic matters was included as part of the request for SEARs submitted for the Limondale Sun Farm (October 2016). That assessment informed the SEARs (refer to Section 1.5), which have identified the key matters for assessment in this chapter of the EIS, as follows:

- biodiversity;
- heritage;
- land;
- visual;
- noise;
- transport;
- water;
- electromagnetic interference; and
- cumulative impacts.

In addition to the key matters identified in the SEARs, consideration of impacts to the following has been included in this chapter:

- air quality;
- bushfires; and
- socio-economic.

Where relevant, technical reports have been prepared and appended (refer to Appendices D to H). A summary of mitigation and management measures is included in Chapter 7.

### 6.2 Biodiversity

#### 6.2.1 Introduction

The SEARs require an assessment of the potential impacts of the Limondale Sun Farm project on biodiversity. The SEARs state that this EIS must include:

an assessment of the likely biodiversity impacts of the development (particularly in relation to the Major Mitchell's Cockatoo, *Acacia melvillei* shrubland, a Spear Grass, Black Falcon, Little Eagle, Spotted Harrier and Bitter Quandong), having regard to the NSW Biodiversity Offsets Policy for Major Projects, and in accordance with the Framework for Biodiversity Assessment, unless otherwise agreed by the Department.

Biosis Pty Ltd has prepared a BAR for the project (Appendix D). This section of the EIS summarises the Biosis report and addresses the SEARs requirements for biodiversity.



## 6.2.2 Existing environment

### i Landscape

A 2,070 ha study area was adopted for the BAR which includes the 2,049 ha site boundary as well as portion of the adjoining TSR in the vicinity of the Balranald Substation and along the site access road. The development footprint is defined as the maximum area to be impacted by the project. The study area is a broader area encompassing the development footprint (1,103 ha) plus the immediately surrounding land investigated during the field surveys.

The study area consists of undulating dune/swale agricultural land with remnant native vegetation in isolated patches within cropped paddocks, along roadsides or boundary fences or within the road reserves adjacent to the Balranald Substation. There are no mapped watercourses or drainage lines within the study area, although there are two farm dams. The study area occurs between three river systems; the Wakool and Murray River systems occur approximately 10 km to the south-west and the Murrumbidgee River occurs approximately 6.5 km to the north-west of the study area. Yanga Lake occurs approximately 4.5 km to the north-east.

The South Olary Plain IBRA subregion covers the entire study area and is the subregion used in the assessment. The Murrumbidgee Depression Plains Mitchell Landscape was used in the assessment as it covers most of the development footprint. The study area is within the Murrumbidgee catchment, in western NSW and west of the Great Dividing Range.

### ii Native vegetation

The site is currently used for broad acre cropping, most recently hay. Native vegetation and fauna habitats have been modified by past disturbances associated with land clearing, cropping, livestock grazing and weed invasion. Native vegetation occurs in isolated patches within cropped paddocks, along roadsides or boundary fences or within the road reserves adjacent to Balranald Substation.

Key ecological values identified within the study area include:

- 11.94 ha of the plant community types (PCT) 16 Black Box grassy open woodland of rarely flooded depressions, south western NSW (MR518);
- 17.81 ha of the PCT 58 Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion (MR521);
- 39.5 ha of the PCT 170 Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones (MR542);
- 0.27 ha of the PCT 23 Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones (MR464); and
- 32 hollow bearing trees across the study area.



One TSC Act listed EEC, *Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions*, has been mapped in the study area. No other EECs were mapped in the study area. The development footprint has been designed to avoid the *Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions*.

### iii Threatened species

The study area has an extensive history of use for agricultural purposes, and has recently been used for extensive cropping. Areas of native vegetation are present within the development footprint and may provide habitat for large mammals or highly mobile avian species capable of dispersing across the fragmented landscape. Fauna habitat features in the study area are limited to remnant patch vegetation, scattered trees, hollow-bearing trees and mistletoe.

No permanent or semi-permanent wetlands are present within the development footprint.

The development footprint contains 18 hollow-bearing trees. Large old trees generally provide good habitat for a range of threatened species; however, due to the fragmented and isolated nature of these trees, it is unlikely they provide key habitat for any listed threatened species.

No target species were recorded within the study area during targeted survey. One TSC Act listed species – Major Mitchell's Cockatoo *Lophochroa leadbeateri* – was recorded within the study area and on the southern edge of the development footprint.

Major Mitchell's Cockatoo was observed in the study area and development footprint foraging amongst cereal crops. Major Mitchell's Cockatoo may occasionally utilise trees for foraging and nesting, and may utilise crops and crop weeds, such as Wild Melon *Citrullus* sp., as a food source, but this vegetation does not provide key habitat for listed species.

## 6.2.3 Impact assessment

### i Method

The BAR for the project was prepared in accordance with the NSW *Framework for Biodiversity Assessment* (FBA) (OEH 2014b). The extent of native vegetation within the development footprint was determined using Section 5 of the FBA. This included:

- review of regional vegetation mapping;
- site investigations involving mapping and assessment of vegetation condition;
- detailed mapping of vegetation communities using ArcGIS Collector application and aerial photo interpretation;
- identification and delineation of PCTs in the field; and
- confirmation of PCT identification using community profile descriptions (and diagnostic species tests) from the NSW Vegetation Information System (VIS): Classification Version 2.1.



Flora and fauna assessments of the study area were undertaken on 12 July 2016 and targeted surveys on 11 November 2016. Flora survey methods included mapping of vegetation and condition assessment and targeted surveys. Targeted threatened flora surveys were undertaken in accordance with OEH (2016a) for the following threatened species:

- a spear-grass *Austrostipa metatoris*;
- Bitter Quandong *Santalum murrayanum*;
- Winged Peppergrass *Lepidium monoplocoides*; and
- *Acacia melvillei* Shrubland in the Riverina and Murray-Darling Depression bioregions.

Fauna assessment was habitat-based, seeking to identify the following fauna habitat features of the study area:

- habitat trees including large hollow-bearing trees, availability of flowering shrubs and feed tree species;
- waterbody condition;
- quantity of ground litter and logs; and
- searches for indirect evidence.

## ii Impacts on native vegetation

There are 5.32 ha of native vegetation within the development footprint comprised of eight small isolated patches and vegetation in the adjacent road reserve. The small patches are surrounded by an agricultural matrix resulting in high levels of isolation, heavy weed infestations, soil disturbance and vegetation damage by the surrounding land use.

One TSC Act listed EEC, *Acacia melvillei* Shrubland in the Riverina and Murray-Darling Depression bioregions, has been mapped in the study area. The development footprint has been designed to avoid this community. The project will not result in any impacts to this community.

Two PCTs were identified within the development footprint, described in Table 6.1 and shown in Figure 6.1.

**Table 6.1 Plant community types of the development footprint**

Plant community type	Vegetation formation	Vegetation class	Area
PCT 16 Black Box grassy open woodland of rarely flooded depressions, south western NSW (MR518)	Semi-arid Woodland (Grassy sub-formation)	Inland Floodplain Woodland	2.18 ha
PCT 58 Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion, Moderate/good, (MR521)	Semi-arid Woodland (Shrubby sub-formation)	Semi-arid Sand Plain Woodland	3.14 ha

## iii Impacts on threatened species

### a. Geographic habitat features

An assessment of the occurrence of geographic habitat features, in accordance with Section 6.3 of the FBA was undertaken, along with a determination of whether impacts to these habitat features will result from the project. The results of this assessment, along with the species determined by the FBA calculator as potentially occurring in these habitats are outlined in Table 6.2.



**Table 6.2 Assessment of species and associated geographical habitat features within the development footprint**

Scientific name	Common name	Habitat feature	Habitat present in development footprint
<i>Lepidium monoplacoides</i>	Winged Peppergrass	Land containing seasonally damp or waterlogged sites	Yes
<i>Falco hypoleucos</i>	Grey Falcon	Land within 100 m of riparian woodland on inland rivers containing mature living eucalypts or isolated hollow bearing trees overhanging water or dry watercourses	No

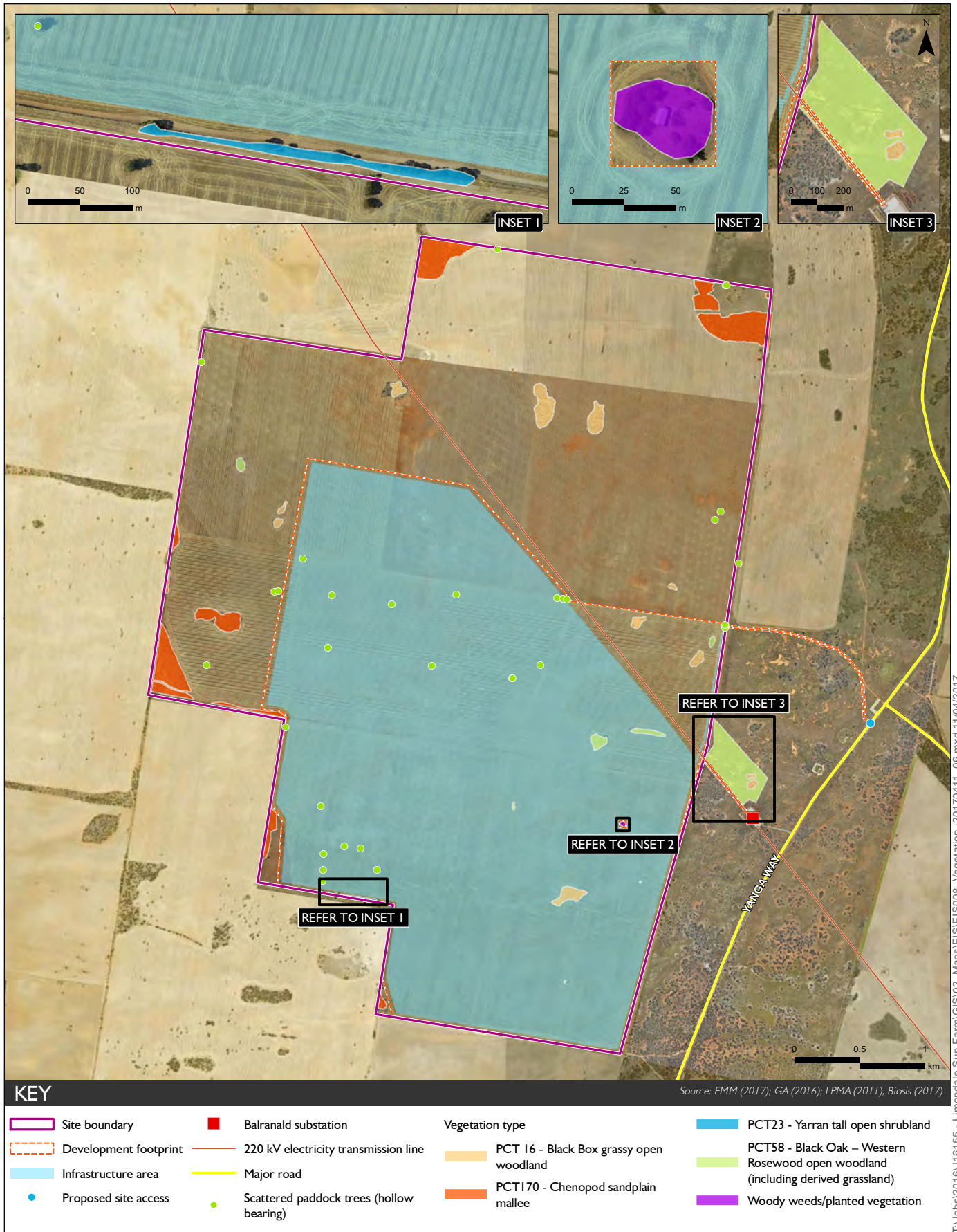
**b. Ecosystem credit species**

A list of ecosystem credit species predicted to occur within the development footprint, based on the PCTs present and generated by the calculator associated with the FBA is provided in Table 6.3. The potential for these species to occur within the development footprint was assessed in accordance with Section 6.3 of the FBA. The presence of these species could not be discounted using the methodology outlined in Section 6.3 of the FBA (OEH 2014b). It was therefore assumed that these species may occur within the development footprint.

**Table 6.3 Ecosystem credit species assumed to occur within the development footprint**

Scientific name	Common name
<i>Anseranas semipalmata</i>	Magpie Goose
<i>Ardeotis australis</i>	Australian Bustard
<i>Burhinus grallarius</i>	Bush Stone-curlew
<i>Certhionyx variegatus</i>	Pied Honeyeater
<i>Circus assimilis</i>	Spotted Harrier
<i>Daphoenositta chrysoptera</i>	Varied Sittella
<i>Grantiella picta</i>	Painted Honeyeater
<i>Grus rubicund</i>	Brolga
<i>Hieraaetus morphnoides</i>	Little Eagle
<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo
<i>Melanodryas cucullata subsp. cucullata</i>	Hooded Robin (south-eastern form)
<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat
<i>Pachycephala inornata</i>	Gilbert's Whistler
<i>Polytelis anthopeplus subsp. monarchoides</i>	Regent Parrot (eastern subspecies)
<i>Pomatostomus temporalis subsp. temporalis</i>	Grey-crowned Babbler (eastern subspecies)
<i>Stagonopleura guttata</i>	Diamond Firetail
<i>Vespadelus baverstocki</i>	Inland Forest Bat

No threatened flora species were identified within the study area despite targeted surveys being undertaken.



GDA 1994 MGA Zone 54

Plant community types at the site  
 Limondale Sun Farm  
 Environmental impact statement  
 Figure 6.1



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### c. Species credit species

A list of species credit species predicted to occur within the development footprint, based on the PCTs present, along with an assessment of whether the development footprint provides suitable habitat and whether the species will be impacted by the development is provided in Table 6.4. The potential for a species to occur within the development footprint was assessed in accordance with Section 6.5 of the FBA.

**Table 6.4 Species credit species and status within development footprint**

Scientific name	Common name	Habitat present in development footprint	Recorded during field surveys	Impacted by development
<i>Austrostipa metatoris</i>	A spear-grass	Yes	No	No
<i>Santalum murrayanum</i>	Bitter Quandong	No	N/A	N/A
<i>Lepidium monoplacoides</i>	Winged Peppergrass	Yes	No	No

### iv Summary of potential impacts

The following potential direct and indirect impacts of the project on biodiversity values were identified:

- direct impacts:
  - removal of 5.32 ha of native vegetation within the development footprint, including 18 hollowing bearing trees;
- indirect impacts:
  - decreased viability of retained vegetation due to edge effects and use of retained areas of native vegetation due to disturbance and degradation of habitat, including erosion and/or compaction of soils, as well as damage to seedlings and new growth;
  - encroachment of invasive exotic weeds species, leading to loss of habitat and suppression of native seedling establishment resulting in changes to vegetation communities over time; and
  - temporary increased noise levels from construction equipment, leading to disturbance of fauna, especially during breeding seasons.

The PCTs identified within the development footprint, which are described in Table 6.1 and shown in Figure 6.1, do not represent any EECs listed under the TSC Act and EPBC Act, respectively.

### 6.2.4 Management and mitigation

The principal means to reduce impacts on biodiversity values within the study area has been to design the development footprint such that it will avoid and minimise removal of native vegetation and fauna habitat. These are described below.

#### i Avoidance of impacts

The project design process has considered all biodiversity values identified on the site. The project has been designed to avoid, where possible, direct impacts to the identified values.



As a result, removal of native vegetation is limited to small isolated patches within cropped paddocks or small corridors through previously disturbed areas. Disturbance will be restricted to the development footprint identified in Figure 2.1, impacting a total of 5.32 ha of native vegetation.

## ii Minimise impacts

Additional measures to avoid and minimise impacts will be outlined in an EMP and will include:

- installation of appropriate exclusion fencing around trees and vegetation to be retained in, or directly adjacent to, the development footprint;
- all material stockpiles, vehicle parking and machinery storage will be within cleared areas or areas proposed for clearing, and not in areas of retained native vegetation;
- a licensed wildlife salvage team will be on-site during vegetation removal to catch and relocate (if appropriate) any wildlife encountered in vegetation or hollow-bearing trees;
- where practical, all scattered hollow-bearing trees to be removed will be placed in areas of retained vegetation to provide additional fauna habitat;
- where appropriate native vegetation cleared from the development footprint will be mulched for reuse on the site, to stabilise bare ground;
- dust suppression measures will be implemented during construction;
- implementation of temporary stormwater controls during construction will be considered if necessary to ensure that runoff is consistent with existing conditions; and
- an erosion and sediment control plan in accordance with *Managing Urban Stormwater: Soils & Construction* (Landcom 2004) will be prepared in consultation with BSC and will be implemented and monitored during the life of the project to minimise impacts.

## iii Offsetting impacts

### a. Impacts requiring offsets

Impacts on native vegetation requiring offsetting were assessed in accordance with Section 9.3.1 of the FBA. The project will result in removal of the following:

- 2.18 ha of PCT 16 Black Box grassy open woodland of rarely flooded depressions, south western NSW (MR518);
- 3.14 ha of the PCT 58 Black Oak – Western Rosewood open woodland on deep sandy loams of Murray-Darling Depression and Riverina Bioregions (MR521); and
- 18 isolated hollow bearing trees.

Impacts on the two PCTs will require offsetting. The remainder of the development footprint supports non-native vegetation and disturbed land. No further consideration of these areas is required. Impacts to native vegetation will require retirement of 158 biodiversity credits as shown in Table 6.5.



**Table 6.5 Summary of ecosystem credits**

Plant community type name	PCT code	Ecosystem credits required
Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	MR518	76
Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	MR521	82
	<b>Total</b>	158

Impacts on species and populations requiring offsets were assessed in accordance with Section 9.3.2 of the FBA. The project will not result in removal of habitat for threatened species and populations. No offsets for species or populations are required.

**b. Biodiversity offset strategy**

A total of 158 ecosystem credits are required to offset the impacts arising from the project. The proposed biodiversity offset strategy will follow Section 7 of the NSW *Biodiversity Offsets Policy for Major Projects* (OEH 2014a).

OVERLAND is currently investigating the suitability of vegetation on surrounding properties to satisfy the offset requirements. Overland has elected to seek retirement of the credits by first party offset or purchasing them on the open market, subject to availability.

In the first instance, every effort to obtain like-for-like offsets has been, or will be, pursued. In the preparation of this Biodiversity Offset Strategy the BioBanking public register has been checked for the availability of credits of the same PCT as that being impacted or those listed in the credit profile report. There are no matching credits currently available on the public register.

Consistent with the recommendations outlined in Appendix A of OEH (2014a), an expression of interest for the required credits will be placed on the OEH 'Credits Wanted Register'. OVERLAND will contact OEH and BSC to ascertain whether any suitable credits or land held by BSC are available.

Should a period of six months lapse since the expression of interest was placed on the public register, with no positive outcome, and all other reasonable steps have been exhausted, then in accordance with the FBA a variation to the offset rules will be applied in which credits can be sought from a PCT in the same vegetation formation as the PCT to which the required ecosystem credits relate (OEH 2014b). PCT 16 is from the Semi-arid Woodlands (Grassy subformation) vegetation formation and PCT 58 from the Semi-arid Woodlands (Shrubby subformation) vegetation formation. A review of the credit register on 24 February 2017 showed that, at this stage, there are no credits listed under these vegetation formations.

OVERLAND is also liaising with two neighbouring landholders to assess the suitability of native vegetation offsets on their properties. This work is ongoing and will involve collection of biometric data, vegetation mapping and input of data into the FBA calculator to determine the suitability of these offset sites (ie whether or not they meet like for like requirements). OVERLAND will continue to consult with DP&E and OEH regarding the progress of these offset investigations.



### **6.2.5 Conclusion**

A BAR has been completed in accordance with the NSW *Biodiversity Offsets Policy for Major Projects* (OEH 2014a) and FBA (OEH 2014b).

The site assessment identified areas of PCT 16 – Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (MR518) and PCT 58 Black Oak – Western Rosewood open woodland on deep sandy loams of Murray-Darling Depression and Riverina Bioregions (MR521) within the development footprint. These PCTs do not represent any EEC listed under the TSC Act and EPBC Act, respectively.

The impact of the project will be limited to removal of 5.32 ha of native vegetation and 18 hollow bearing trees unlikely to provide key habitat for any listed threatened species. Measures to avoid and minimise impacts to vegetation were considered during the design and planning stage of the project, with the objective of significantly minimising impacts on native vegetation. Additional recommendations to mitigate any minor residual impacts are provided in Section 6.2.4.

Residual impacts to native vegetation will require retirement of 158 biodiversity credits. These will be offset in accordance with the biodiversity offset strategy and processes outlined in the relevant government policies (OEH 2014a and OEH 2014b).

## **6.3 Aboriginal cultural heritage**

### **6.3.1 Introduction**

The SEARs require an assessment of the potential impacts of the Limondale Sun Farm project on Aboriginal cultural heritage. The SEARs state that this EIS must include:

an assessment of the likely Aboriginal and historic (cultural and archaeological) impacts of the development, including adequate consultation with the local Aboriginal community.

Biosis Pty Ltd has prepared an ACHAR for the project (Appendix E). This section of the EIS summarises the Biosis report and addresses the SEARs requirements for Aboriginal cultural heritage assessment. Historic heritage is addressed in Section 6.4.

### **6.3.2 Existing environment**

#### **i Landscape context**

A 2,058 ha study area was adopted for the ACHAR which encompassed the site boundary, as well as portions of the adjoining TSR in the vicinity of the Balranald Substation and along the site access road. The study area is located in far south-west NSW, an area characterised by its ancient lakes and waterways. The broader landscape formed over 60 million years when an inland sea covered the area. The study area is a broader area encompassing the development footprint (1,103 ha) plus the immediately surrounding land investigated during the field surveys.



The Murray Darling Depression IBRA bioregion is dominated by dunefields, sandplains and undulating plains of brown calcareous soils that are all of Tertiary and Quaternary age deposited from a shallow inland sea. Over time the sandy surface has been reworked into dunes and sandplains with the dunes in the study area being of a linear east-west orientation. All of the lakes and swamps in this bioregion have well-formed lunettes on their eastern margins. These lunettes have high potential to contain *in-situ* evidence of human occupation which could be of great antiquity (NPWS 2003).

The area surrounding the study area supports natural and modified vegetation communities. Resources in the vicinity of the study area would have provided adequate sources of nutrition for subsistence activities; however, these resources would be largely tied to seasonal variations and the flow of the nearby Murrumbidgee River.

Aboriginal occupation of the region dates back to around 50,000 years ago (Hiscock 2008). The study area falls within an area identified by Tindale (1974) as being within the boundaries of the Mutthi Mutthi (Mathi Mathi) linguistic group. Although the boundaries of this group vary between the two maps, the area occupied by the Mutthi Mutthi lies roughly from below Lake Mungo to down past Balranald.

To the west the Kureinji and Dadi Dadi groups are identified, the north is identified as the Barinji group and to the south is the Wathi Wathi (Wati Wati) group. The Yitha Yitha group are identified around the junction of the Lachlan and the Murrumbidgee to the east of the study area, while the Nari Nari are identified around the same area, but on the south side of the Lachlan River (Martin 2006).

Owing to the disturbance of Aboriginal culture by the arrival and colonisation of Australia by Europeans in the 18<sup>th</sup> and 19<sup>th</sup> centuries, the actual boundaries of these groups are difficult to identify with great confidence. Martin (2006) studied ethnographic sources from early European observers in an attempt to define these boundaries. Martin notes that the Mutthi Mutthi group was likely to have originally been comprised of two groups with similar languages, the Mutthi Mutthi, located near the junction of the Murray and Murrumbidgee, and the Wathi Wathi, located around present-day Balranald (Martin 2006). Martin states that it is likely that these groups amalgamated at some point in recent history to form one group. The Mutthi Mutthi people were associated with Balranald, Carrawathal, Lake Benanee, Lake Reedy and Murrumbidgee River. More broadly the Mutthi Mutthi language group is associated with the Kulin language group of western Victoria (Martin 1999).

The township of Balranald was gazetted in 1851 as part of the wider settlement that occurred along the Murrumbidgee River in the Riverina Bioregion. Over the last 150 years, the region has seen extensive changes regarding vegetation distribution and condition (Eardley 1999). The site is currently used for broad acre cropping, most recently hay.

The study area initially formed part of the Yanga holding, before being subdivided and leased to brothers Joseph and H. T. Limon in the early 1890s, when the property was given the name of 'Maffra' (NSW Parish Map 1894). The land appears to have been used for grazing during this time and stayed in the hands of the Limon family into the 1920s (NSW Parish Map 1924; Riverina Recorder 1934).

An extensive search of the AHIMS database was conducted on 7 July 2016 (Client service ID: 233168). The search identified 113 Aboriginal archaeological sites within a 5 km search area, centred on the study area. The AHIMS site types identified in the search area included Burials, Earth Mounds, Hearths, Artefacts, Shells and Modified Trees. Five registered sites were located within the study area. The AHIMS sites within the study area are 47-5-0008, 47-6-0603, 47-6-0604, 47-5-0605, and 47-5-0606 and are shown in Figure 6.2.



### **6.3.3 Impact assessment**

#### **i Aboriginal community consultation**

Aboriginal stakeholders were identified in accordance with OEH's Aboriginal cultural heritage consultation requirements for proponents (DECCW 2010) and the Draft guidelines for Aboriginal cultural heritage impact assessment and community consultation (DEC 2005). The guidelines outline a four stage process, described below.

##### **a. Stage 1 – Notification and registration**

Relevant bodies were notified of the project, including BSC, OEH, NSW Native Title Services Corporation Limited (NTSCORP Limited), Office of the Registrar, Aboriginal Land Rights Act 1983 of Aboriginal Owners, National Native Title Tribunal (NNTT), and Balranald Local Aboriginal Land Council (BLALC).

A search conducted by the Office of the Registrar listed no Aboriginal Owners with land within the site boundary. A search conducted by the National Native Title Tribunal listed one Registered Native Title Claim, two Native Title Determination Applications and no Registered Indigenous Land Use Agreements within the study area.

An advertisement was published in *The Guardian* on Wednesday 16 November 2016 inviting Aboriginal people who hold cultural knowledge to register their interest to provide assistance in determining the significance of Aboriginal object(s) and/ or places in the vicinity of the project.

OEH provided a list of known Aboriginal stakeholders in the Balranald and Murray River LGAs. Aboriginal groups identified by the OEH were sent a letter inviting them to register their interest in providing assistance to determine the significance of Aboriginal object(s) and/or places in the vicinity of the project.

In response to the letters and public notice, a total of three groups registered their interest in the consultation process; The Wakool Aboriginal Corporation, Pappin Aboriginal Corporation and Yita Yita / Nari Tribes Aboriginal Corporation.

##### **b. Stage 2 – Presentation of project information**

A project information pack was provided to the registered Aboriginal parties (RAPs) on 19 December 2016. The project information pack included information about the project, the Aboriginal cultural heritage assessment process, the project schedule, and the responsibilities and roles of the different parties involved in the project.

##### **c. Stage 3 – Gathering information about cultural significance**

On 19 December 2016 RAPs were provided with a copy of the project method outlining the proposed Aboriginal cultural heritage assessment process to be undertaken. RAPs were given 28 days to review and prepare feedback on the proposed methodology. No comments from RAPs were received regarding the methodology of the ACHAR.

As part of the site survey conducted on 23, 24 and 25 January 2017, cultural information offered by the site representatives was recorded. Neville Williams attended the site survey and during the survey spoke about sites known nearby which included mounds, scar trees and campfires. Specific details and locations were not given.

Although unable to attend the site survey, John Jackson met with Biosis in Balranald. John shared stories of his experiences in the area and provided some details about how he identified scar trees.



**d. Stage 4 – Review of draft Aboriginal cultural heritage assessment report**

The Draft ACHAR has been provided to RAPs for review and comment. RAPs have been provided with 28 days to provide comments on the ACHAR.

**ii Site prediction modelling**

A model was formulated to broadly predict the type and character of Aboriginal cultural heritage sites likely to exist throughout the study area and where they are more likely to be located. This model is based on:

- local and regional site distribution in relation to landform features identified within the study area;
- consideration of site type, raw material types and site densities likely to be present within the study area;
- findings of the ethnohistorical research on the potential for material traces to present within the study area;
- potential Aboriginal use of natural resources present or once present within the study area; and
- consideration of the temporal and spatial relationships of sites within the study area and surrounding region.

The predictive model assessed the potential for certain Aboriginal heritage sites to be present within the project boundary as shown in Table 6.6.

**Table 6.6 Aboriginal site prediction statements**

Site type	Site description	Potential
Scar trees	Trees with cultural modifications.	High
Earth mounds	Deposits of baked clay, charcoal, shell and bone which indicate multiple occurrences of occupation. Often contain human remains.	High
Hearths	Deposits of baked clay, charcoal, shell and bone which indicate a single use event.	High
Shell middens	Deposits of shells accumulated over either singular large resource gathering events or over longer periods of time.	Moderate
Quarries	Raw stone material procurement sites.	Low
Potential archaeological deposits (PADs)	Potential sub surface deposits of cultural material.	Moderate
Flaked stone artefact scatters and isolated artefacts	Artefact scatter sites can range from high-density concentrations of flaked stone and ground stone artefacts to sparse, low-density 'background' scatters and isolated finds.	High
Grinding grooves	Grooves created in stone platforms through ground stone tool manufacture.	Low
Burials	Aboriginal burial sites.	Moderate
Rock shelters with art and / or deposit	Rock shelter sites include rock overhangs, shelters or caves. These features may contain rock art, stone artefacts or midden deposits and may also be associated with grinding grooves.	Low
Aboriginal ceremony and dreaming sites	Such sites are often intangible places and features and are identified through oral histories, ethnohistoric data, or Aboriginal informants.	Moderate
Post-contact sites	These are sites relating to the shared history of Aboriginal and non-Aboriginal people of an area and may include places such as missions, massacre sites, post contact camp sites and buildings associated with post contact Aboriginal use.	Moderate
Aboriginal places	Aboriginal places may not contain any 'archaeological' indicators of a site, but are nonetheless important to Aboriginal people. They may be places of cultural, spiritual or historic significance. Often they are places tied to community history and may include natural features (such as swimming and fishing holes), places where Aboriginal political events commenced or particular buildings.	Low



### iii **Aboriginal cultural heritage field survey**

A field survey of the study area was undertaken on 23, 24 and 25 January 2017. The archaeological survey was conducted on foot with a field team of three members. The survey effort targeted all landforms within the study area and included re-identification of five sites within the study area on the AHIMS register.

The survey followed the archaeological survey requirements of the code and industry best practice methodology. Any potential Aboriginal objects observed during the survey were documented and photographed. A total of eleven transects were walked across two landforms with the surveyors walking 2 m apart.

The overall effectiveness of the survey was limited due to poor ground surface visibility caused by wheat and other cropping across the majority of the site.

The survey effort re-identified all previously identified sites in the study area in order to assess their current condition. It also identified 11 previously unrecorded Aboriginal sites within the study area, one of which was associated with a new PAD. The project design has avoided impacts to eight of the 11 newly identified sites, with three items, Limondale 1, 9 and 11, remaining within the development footprint. Similar to the AHIMS sites identified in the vicinity of the study area the most prominent site types are earth mounds, artefact scatters and campfires. Earth mounds indicate long term use of the landscape by Aboriginal people. Of the five AHIMS sites identified within and in the immediate vicinity of the development footprint, two sites, 47-6-0605 and 47-6-0606, are within the development footprint in the transmission line corridor, and will be impacted.

It was difficult to confirm whether the sites conform to the regional predictive model as the landscape has been heavily modified. Aboriginal heritage sites identified are shown in Figure 6.2.

### iv **Significance assessment**

An assessment of significance was completed for each of the Aboriginal sites within the site boundary. The significance assessment was carried out in accordance with the requirements of the *Burra Charter* (Australia ICOMOS 1999) and the *Guide to Investigating and Reporting on Aboriginal Heritage* (DECC 2006).

Of the 11 newly identified Aboriginal sites, two are assessed as being of high scientific significance, seven of moderate significance and two of low significance. The two AHIMS sites that will be impacted are assessed as being of moderate significance. The project design has avoided impacts to each of the items assessed as being of high scientific significance, with five items remaining within the development footprint. Two of these items are of low scientific significance and three are of moderate scientific significance. A summary of the potential archaeological impact of the project on known Aboriginal sites within the site boundary is provided in Table 6.7.



**Table 6.7** Summary of potential Aboriginal cultural heritage archaeological impact

Site name	Within development footprint	Significance	Type of harm	Degree of harm	Consequence of harm
Limondale 1	Yes	Moderate	Total	Total	Total loss of value
Limondale 2	No	Moderate	None	None	No loss of value
Limondale 3	No	Low	None	None	No loss of value
Limondale 4	No	Moderate	None	None	No loss of value
Limondale 5	No	Moderate	None	None	No loss of value
Limondale 6	No	High	None	None	No loss of value
Limondale 7	No	Moderate	None	None	No loss of value
Limondale 8	No	Moderate	None	None	No loss of value
Limondale 9	Yes	Low	Direct	Total	Total loss of value
Limondale 11	Yes	Low	Direct	Total	Total loss of value
Limondale 12	No	High	None	None	No loss of value
47-6-0605	Yes	Moderate	Total	Total	Total loss of value
47-6-0606	Yes	Moderate	Total	Total	Total loss of value

The assessment of significance for the three sites impacted by the project are summarised below.

**a. Statement of significance for Limondale 1**

Limondale 1 is a hearth with associated artefact scatter located on a graded track. The hearth is relatively intact and it appears to continue below the surface indicating some subsurface integrity may exist. The associated artefact scatter is in situ. This site type is common for the region and is in good condition so it is considered to have moderate scientific significance.

**b. Statement of significance for Limondale 9**

Limondale 9 was an isolated find, a longitudinal silcrete flake fragment with a feather termination, found exposed in a ploughed area of white sand dune. Stone flakes are a common site type in the region and this site has been highly disturbed by ploughing. It has low scientific significance.

**c. Statement of significance for Limondale 11**

One isolated hearth feature, Limondale 11, was located on a flat between Mallee cliff sand dunes in the southern portion of the study area. The site consists of burnt calcrete heat retainers and is the only hearth of this type identified during the survey. The site has been highly disturbed by ploughing and has low scientific significance.

**d. Statement of significance for AHIMS sites 47-6-0605 and 47-6-0606**

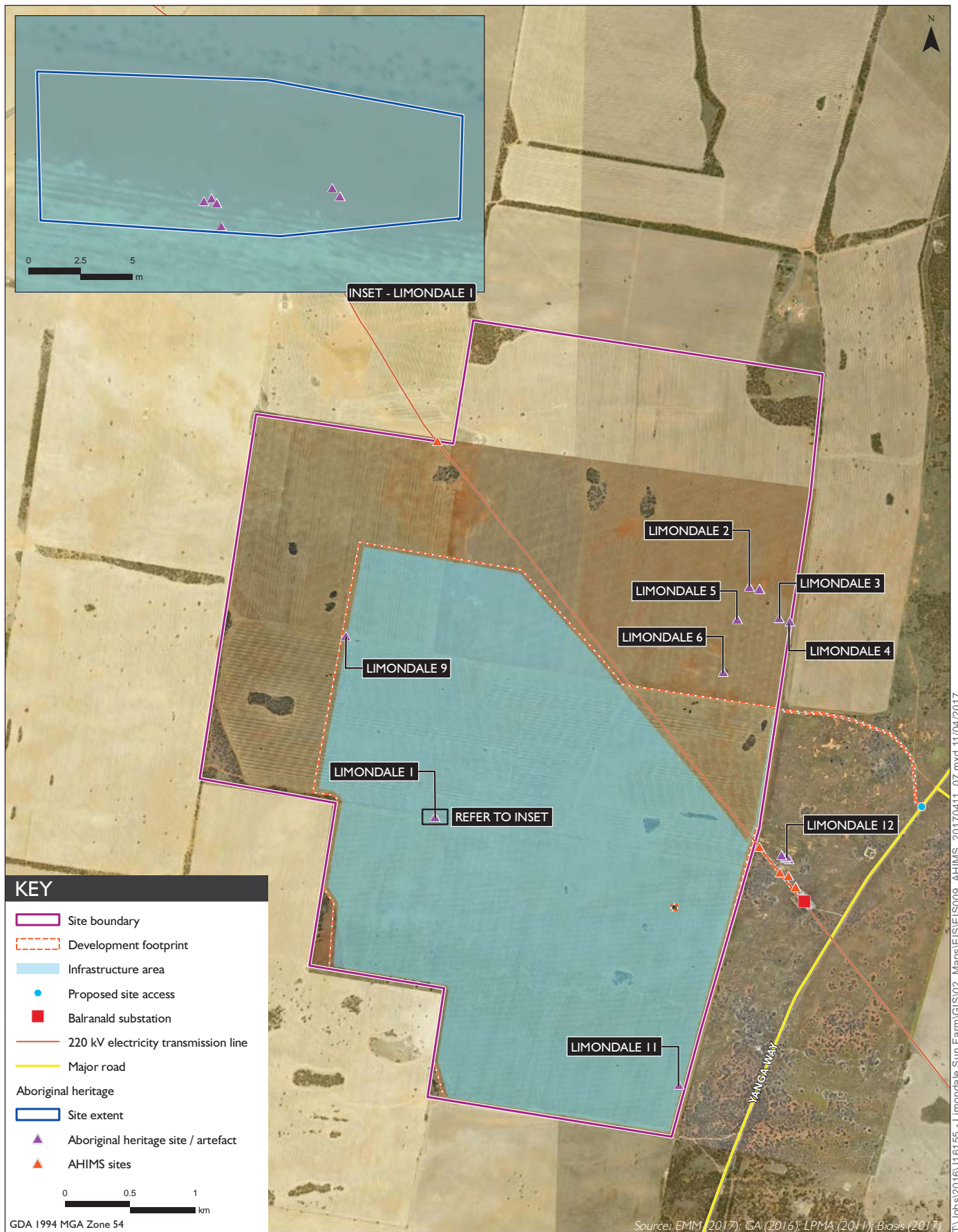
The two sites identified on the AHIMS database that will be impacted, 47-6-0605 and 47-6-0606, are both identified as hearths with potential archaeological deposits. No reports were available on the AHIMS database (refer Appendix E). These two sites have been identified as having moderate scientific significance.



#### 6.3.4 Management and mitigation

The project design process has avoided impacts to eight of the 11 newly identified Aboriginal heritage sites within the site boundary, and three of the five AHIMS sites within and near the site boundary. The following management and mitigation measures will be implemented:

- Limondale 1, 9 and 11 will be salvaged prior to construction;
- further assessment, in the form of sub-surface testing, of AHIMS sites 47-6-0605 and 47-6-0606 will be completed prior to construction,;
- consultation with the RAPs will continue in regards to the management of Aboriginal cultural heritage sites within the site boundary throughout the life of the project in keeping with the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010);
- should any unanticipated Aboriginal objects be encountered during works associated with this project, works will cease in the vicinity and the find will not be moved until assessed by a qualified archaeologist;
- should unanticipated relics be discovered during the course of the project, work in the vicinity will cease and an archaeologist will be contacted to make a preliminary assessment of the find. The Heritage Council will be notified if the find is assessed as a relic;
- if any suspected human remains are discovered during any activity the following will occur:
  - all work will immediately cease at that location and remains will not be further moved or disturbed;
  - the NSW Police and OEH's Environmental Line (131 555) will be notified of the details of the remains and their location as soon as practicable;
  - work will not recommence at that location unless authorised in writing by OEH; and
- if the human remains are likely to be Aboriginal in origin, the find will be reported to the RAPs and OEH. If the find is likely to be non-Aboriginal in origin and more than 100 years in age, the Heritage Council of NSW will be notified of the find under s.146 of the Heritage Act.



Location of Aboriginal heritage sites

Limondale Sun Farm  
Environmental impact statement

Figure 6.2



### 6.3.5 Conclusion

The project design has avoided impacts to Aboriginal heritage sites as far as practicable. The project will avoid harm to eight of the 11 newly identified Aboriginal heritage sites identified within the site boundary. Salvage is recommended for the three sites that will be impacted, Limondale sites 1, 9 and 11, to retrieve as much information from them as possible. Two further sites, AHIMS sites 47-6-0605 and 47-6-0606, will be impacted and further assessment in the form of subsurface investigation is proposed.

The implementation of the management and mitigation measures listed in Section 6.3.4 will reduce the impacts of the project on Aboriginal cultural heritage values.

## 6.4 Historic heritage

### 6.4.1 Introduction

The SEARs require an assessment of the potential impacts of the Limondale Sun Farm project on historic heritage. The SEARs state that this EIS must include:

an assessment of the likely Aboriginal and historic (cultural and archaeological) impacts of the development, including adequate consultation with the local Aboriginal community.

EMM conducted a desktop assessment of the potential impact of the project on historic heritage. This section of the EIS summarises the results of this assessment and addresses the SEARs for historic heritage. Aboriginal cultural heritage is addressed in Section 6.3.

### 6.4.2 Existing environment

The Heritage Act provides for the protection and conservation of the natural and cultural history of NSW, including scheduled heritage items, sites and relics, and makes provisions for items of both local and state significance. The State Heritage Register (SHR) is enforced under the Heritage Act. The Balranald LEP also makes provisions for heritage significance.

There are seven items of local heritage significance and one item of international/state significance listed within the Balranald LEP. Of the seven items of local heritage significance, four are identified as Aboriginal and three are identified as general. The closest general item of local heritage significance to the site boundary is the Balranald Fire Station in the township of Balranald, approximately 14 km north of the site. The item of international/state significance listed within the Balranald LEP is the Willandra Lakes Region, a World Heritage Property, which occupies a total area of 3,600 km<sup>2</sup> approximately 134 km north-west of the site.

A search of the SHR on the 28 February 2017 returned the following results for the Balranald Shire LGA:

- one Aboriginal place listed under the NPW Act, the Diplo Ceremonial Ground, approximately 12 km north of the site;
- one item listed under the Heritage Act, the Willandra Lakes Region, described above; and
- 25 items listed by local government and state agencies, the closest of which is the Balranald Fire Station, described above.

A search of the SHR on the 28 February 2017 identified a number of statutory listed items in the neighbouring Wakool Shire LGA. The majority of these items are in the suburbs of Barham and Swan Hill, approximately 100 km south-east and 60 km south of the site boundary, respectively.



A search of the Australian Heritage Database on the 28 February 2017 identified 13 results within the Balranald Shire LGA. This includes three listings for the Willandra Lakes Region (one as a registered site in the Register of the National Estate, one as a World Heritage List item and one as a National Heritage List item) and 10 additional listings on the Register of the National Estate. The Register of the National Estate was closed in 2007 and is no longer a statutory list; however it is still maintained on a non-statutory basis as a publicly available archive and educational resource. Nonetheless, the closest sites to the site boundary are the Balranald Courthouse and Balranald Post Office, which are both in the township of Balranald approximately 14 km north of the site.

A search of the Australian Heritage Database on the 8 March 2017 identified seven results within the neighbouring Wakool Shire LGA. This includes four listings within Balranald, including two registered indigenous places (location not listed), Great Cumbungi Swamp Area (approximately 28 km north of the site boundary), and Yanga Nature Reserve (part of the Yanga National Park).

During an archaeological field survey as part of the ACHAR (Appendix E), the ruins of a house were identified within the site (refer to Figure 6.2). The house is not listed on any heritage register or database.

### **6.4.3 Impact assessment**

The project will not impact any items of local, State, National or World heritage significance identified on the SHR, Balranald LEP or Australian Heritage Database.

The ruins identified within the site boundary (Figure 6.2) will not be impacted by the project. A buffer of at least 20 m will be maintained around the ruins throughout the life of the project.

### **6.4.4 Management and mitigation**

An unexpected finds protocol will be followed if unexpected historical archaeology is discovered during construction of the project.

If unexpected historical archaeology is discovered during construction, work in the immediate area will cease and an archaeologist will be contacted to make a preliminary assessment of the find. If it is determined to be a relic under the Heritage Act, further investigation may be required and the Heritage Council may need to be notified.

### **6.4.5 Conclusion**

The project will not impact any items of local, State, National or World heritage significance, or the potential significance of any known items.



## **6.5 Land**

### **6.5.1 Introduction**

The SEARs require an assessment of the potential impacts of the Limondale Sun Farm project on land use. The SEARs state that this EIS must include:

an assessment of the impact of the development on agricultural land and flood prone land (including any Crown land, Travelling Stock Reserves, Stock Watering Place and Timber Reserve), paying particular attention to compatibility of the development with the existing land uses on the site and adjacent land (e.g. aerial spraying, dust generation, and risk of weed and pest infestation) during operation and after decommissioning, with reference to the zoning provisions applying to the land.

A desktop assessment of the site was undertaken and relevant publicly available information about the site was reviewed and assessed. Consultation with the landholder, affected landholders surrounding the site boundary and members of the local community has also been undertaken (refer to Section 5.4). The impact of the project on flood prone land is addressed in Section 6.9.

### **6.5.2 Existing environment**

#### **i Zoning**

The site is zoned RU1 Primary Production under the Balranald LEP. The objectives of this zone are discussed in Section 4.1.4. Two parcels of land east of the site boundary and Yanga Way (Figure 2.2) are zoned RU3 Forestry under the Wakool LEP. The objectives of this zone are:

- to enable development for forestry purposes; and
- to enable other development that is compatible with forestry land uses.

The project will alter the current land use of the site, being agriculture, to electricity generation. The project will harness a natural resource, namely solar energy. As noted in Section 4.1.4, whilst the project will impact the availability of land for other primary production, it will allow for and encourage diversity in the area's land use, and will provide economic stimulus and support to rural communities.

#### **ii Geology, soils and land capability**

The surface geology of the site is mapped in the Balranald 1:250,000 Geological Map (NSW Geological Survey n.d.). The majority of the site, including the development footprint, is part of the Woorinen Formation geological sequence which dates back to the Late Pleistocene to Holocene age and is characterised by red brown silty sand to sandy clay soils. A small portion of the site, outside of the development footprint and close to the northern boundary, is part of the Shepparton Formation geological sequence.

The site is in a Mallee dune-swale landscape with grey to brown clay/loam soils prevalent in swales and brown to orange sandy/loam soils prevalent on dune crests. The soil landscapes present on the site include the Murrumbidgee scalded plains, Murrumbidgee depression plains and Mallee cliffs sandplains (Biosis 2017).

The Murrumbidgee scalded plains soil landscape is characterised as a flat alluvial landscape consisting of sediments of grey, brown and red cracking clays and red-brown texture contrast soils (DECC 2002).



The Murrumbidgee depression plains soil landscape is characterised by alluvial plains with numerous circular depressions to a relief of 10 m and contains grey to brown clays and clay loams (DECC 2002). The Mallee cliffs sandplains soil landscape includes parts of 12 different land systems and is characterised by slightly undulating sandplains of Quaternary aeolian sands with east-west trending dunes, often with blowouts (DECC 2002).

Information was extracted from the Sharing and Enabling Environmental Data (SEED) Portal (NSW Government 2017), including extracts from the following datasets:

- the Australian Soil Classification (ASC) Soil Type map of NSW, which provides soil types across NSW using the Australian Soils Classification at Order level;
- the Estimated Inherent Soil Fertility of NSW, which uses the best available soils and natural resource mapping to describe soil fertility in NSW according to a five class system;
- the *NSW Strategic Regional Land Use Policy* (SRLUP), which maps strategic agricultural land capable of sustaining high levels of productivity or critical industry clusters, ie equine and viticulture clusters; and
- the Land and Soil Capability (LSC) mapping for NSW, which uses eight key soil and landscape limitations to assess the capability of land according to an eight class system.

Relevant extracts from the SEED Portal are summarised in Table 6.8.

**Table 6.8 Environmental data for the site from the SEED Portal**

Dataset	Environmental data
ASC Soil Type Map of NSW	The majority of the site, including the development footprint, is mapped as calcarosols, which contain calcium carbonate and occur in the low rainfall, arid and semi-arid regions of Australia (CSIRO 2017). A small portion of the site, outside of the development footprint and close to the northern boundary, is mapped as vertosols.
Estimated Inherent Soil Fertility of NSW	The majority of the site, including the development footprint, is classified as moderately low inherent soil fertility. A small portion of the site, outside of the development footprint and close to the northern boundary, is classified as moderate.
SRLUP	The site is not mapped under the SRLUP. The site has not been mapped as Biophysical Strategic Agricultural Land (BSAL) under State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007.
LSC mapping for NSW	The majority of the site (1,801.5 ha), including the majority of the development footprint, is mapped as LSC Class 6 (very severe limitations) (refer to Figure 6.3). Land identified under this classification is recognised as having very severe limitations and is incapable of sustaining many land use practices (eg cultivation, moderate-to-high intensity grazing and horticulture) (OEH 2013). This land is suitable for low intensity land uses (eg low intensity grazing) (OEH 2013). Notwithstanding the limitations of LSC Class 6 land, the site is currently used for broad acre cropping, most recently hay. A small portion of the site (247.4 ha) close to the northern boundary is mapped as LSC Class 4 (moderate to severe limitations) (refer to Figure 6.3).

A search of the EPA’s contaminated land public record of notice and list of sites notified to the EPA under Section 60 of the NSW *Contaminated Land Management Act 1997* did not return any information on reported contamination or any regulatory notices issued for the site (EPA 2017a; EPA 2017b). There is one site under assessment within the Balranald Shire LGA (EPA 2017a). This site is the location of the Caltex Service Station on the Sturt Highway approximately 10 km north of the site.

A search of the contaminated land record of notices did not reveal any records for the Balranald Shire LGA (EPA 2017b). There are no known occurrences of acid sulphate soils within the site boundary.



Clause 7 of SEPP 55 requires that a consent authority take into consideration whether the land is contaminated. The contaminated land planning guidelines *Managing Land Contamination Planning Guidelines: SEPP 55 – Remediation of Land* (Department of Urban Affairs and Planning 1998) identifies activities with the potential to cause contamination. These guidelines list 'agricultural/horticultural activities' as an activity which potentially causes contamination.

Agricultural/horticultural activities have occurred on and in the vicinity of the site. Therefore, agriculturally derived contaminants could be present within the site boundary. However, as noted in Section 3.5, construction of the project will require limited site preparation and civil works and, subsequently, the level of surface disturbance will be minimal.

### **iii Agricultural land**

The project is within the Balranald Shire LGA, which covers an area of 2,169,300 ha in the Murray Darling Depression IBRA bioregion of south-western NSW. The site is part of the Murrumbidgee catchment. Land use within this catchment is dominated by extensive agricultural operations with grazing occupying 64.4% of the total catchment area (Office of Water 2011). Dryland cropping and horticulture (15.5%), conservation (6.4%) and irrigation (5.1%) are also prevalent across the catchment area (Office of Water 2011).

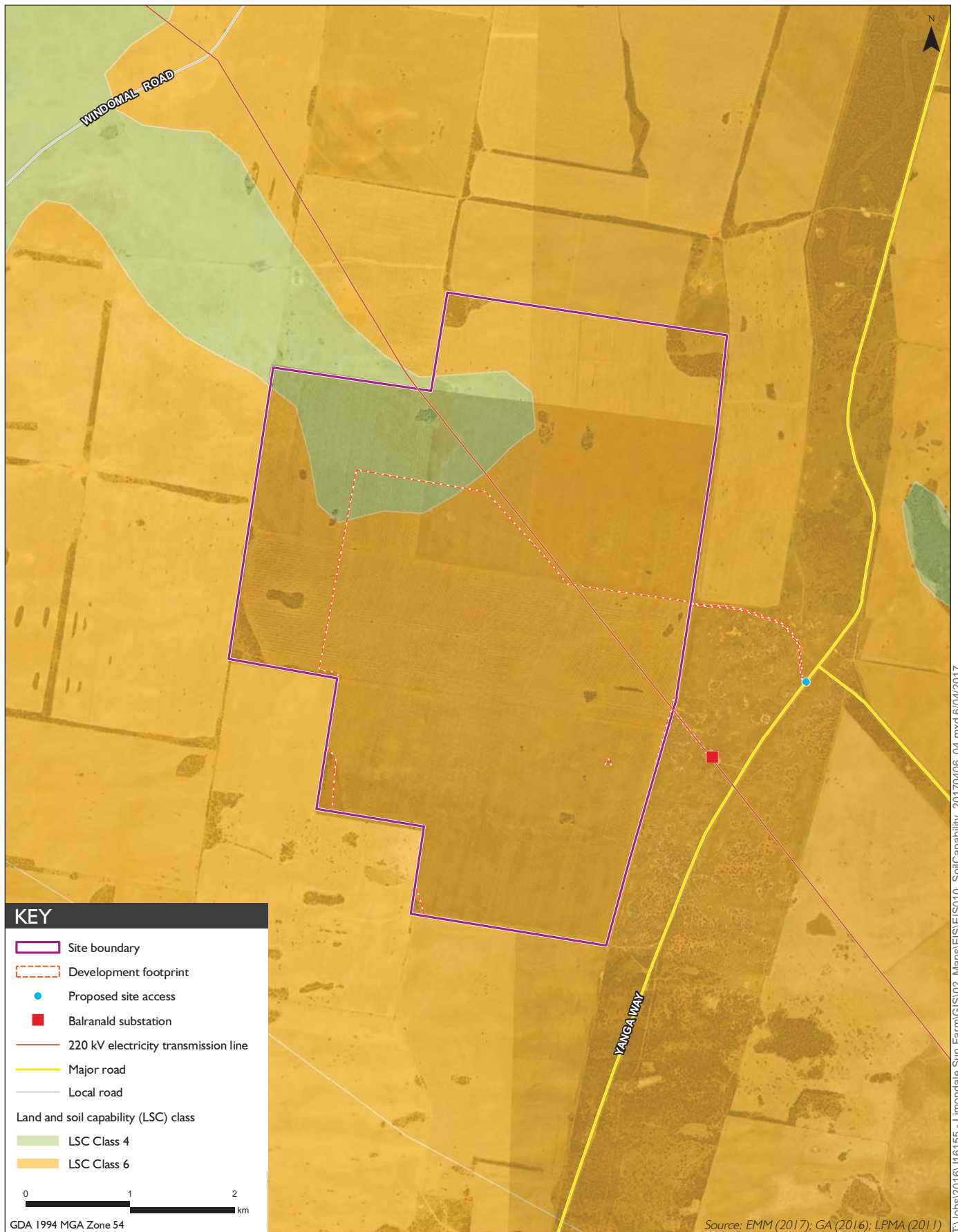
As noted in Section 2.1, the site is currently used for agriculture. Agriculture is the major land use and major employment industry within the Balranald Shire LGA, accounting for approximately 96% of the total land area or approximately 2,075,748 ha and 31% of total employment, which includes employment from more than 170 agricultural businesses (ABS 2013). The majority of agricultural production within the Balranald Shire LGA is classified as production from relatively natural environments and is subject to relatively low levels of intervention due to the land's limited capability (approximately 89%). This includes large areas used for grazing. Production from dryland agriculture and plantations (approximately 10%) and production from irrigated agriculture and plantations (less than 1%) occupy significantly less of the total land mass within the Balranald Shire LGA (ABS 2013).

The site boundary encompasses an area of approximately 2,049 ha, representing approximately 0.09% of the Balranald Shire LGA, whilst the development footprint for the project is approximately 1,103 ha (approximately 0.05%).

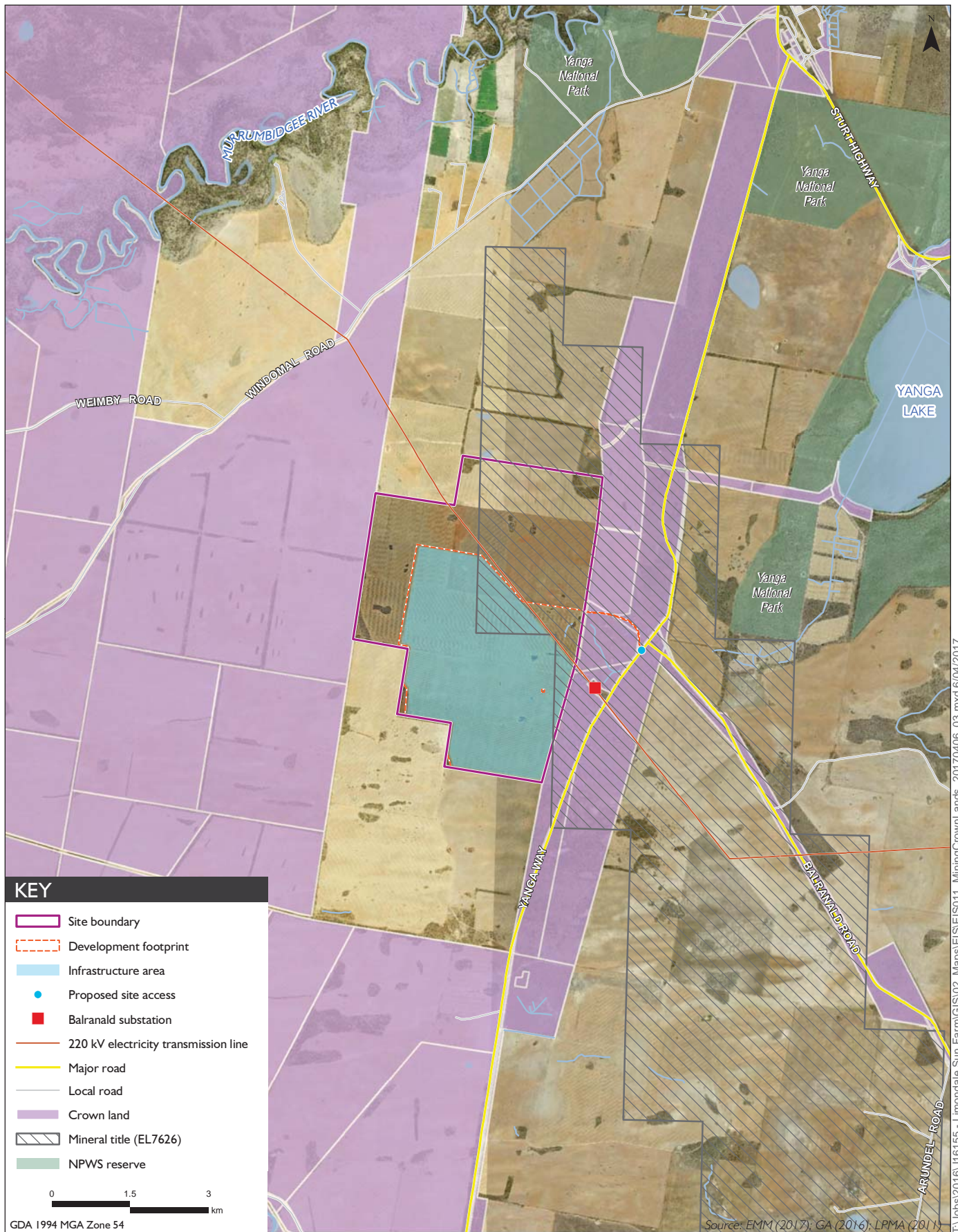
One of the major threats to biosecurity within the Balranald Shire LGA, and more generally within the greater LLS-Western, is the presence of unmanaged goats, rabbits, pigs, foxes, cats and wild dogs, which also threaten agricultural productivity, groundcover and native flora and fauna (LLS Western n.d.).

### **iv Flooding and water resources**

The site is outside of the 'land subject to inundation extent' defined within the Balranald LEP. The impact of the project on flooding and water resources is addressed in Section 6.9.



**Land and soil capability**  
 Limondale Sun Farm  
 Environmental impact statement  
 Figure 6.3



**Crown land and mining tenements**  
 Limondale Sun Farm  
 Environmental impact statement  
 Figure 6.4



## **v Mining and minerals**

One mineral tenement which encompasses a portion of the site was identified in a search of the NSW DoI-DRE DIGS database, an EL issued under the NSW *Mining Act 1992* (EL7626) held by Iluka Resources Limited (Figure 6.4).

## **vi Crown land**

The site's eastern boundary is adjacent to a parcel of Crown land approximately 1.5 km wide, which forms part of a TSR that extends further north and south (TSR R17969, R40639 and R21939). In addition to the TSR, a stock watering place (158 – Ten Mile) and two timber reserves (38823 and 38825) are also east of the site boundary. These parcels of Crown land are identified on Figure 6.4.

## **vii Property vegetation plans**

A PVP is a voluntary, legally binding agreement between a landholder and LLS. A public register of PVPs is maintained by the Land Property Management Authority under the NSW *Real Property Act 1900*. Consultation with LLS Western confirmed that there are no PVPs that will be affected by the project.

As noted in Section 5.3, consultation has been undertaken with LLS to confirm that there are no existing PVPs under the provisions of the NV Act that would be affected by the project. PVPs have not been discussed further in this EIS.

## **6.5.3 Impact assessment**

### **i Introduction**

The project will result in the direct disturbance of approximately 1,103 ha within the project infrastructure area.

As noted in Section 3.5.1, due to the development footprint's relatively flat terrain and predominantly cleared landscape, limited site preparation and civil works will be required. Direct disturbance of the land within the site boundary during the site preparation works will primarily be limited to:

- the establishment of a temporary construction site compound in a fenced off area within the development footprint; and
- construction of access tracks and boundary fencing.

As noted in Section 3.5.2, upon completion of the site establishment and pre-construction activities described above, construction will commence. Direct disturbance of the land within the site boundary during construction will primarily be limited to:

- posts will be driven or screwed into the ground to provide support for the mounting framework required for the PV solar panels;
- foundations for the inverter blocks will be prepared;
- underground cabling will be installed between the PV solar panels and the collection circuit;
- transmission infrastructure will be constructed between the project electrical switchyard and the Balranald Substation;



- the management hub will be constructed; and
- permanent fencing will be constructed.

The installation of approximately 868,000 PV solar panels may affect the capture and flow of runoff within the site, which could result in soil erosion if not appropriately managed.

The project will also result in a significant increase in vehicle movements to and from the site during construction. Subsequently, the project may result in increased levels of soil erosion.

## **ii Geology, soils and land capability**

As noted above, the project may result in increased levels of soil erosion. The susceptibility of soils to erosive forces is dependent on their inherent properties, namely texture, structure and dispersibility (Charman 1978). As noted in Table 6.8, the majority of the site is mapped as calcarosols and there are three soil landscapes present on the site. From a land management perspective, the natural limitations of calcarosols are widespread and include their shallow depth, low water retention ability and vulnerability to wind erosion, particularly for sandier varieties (CSIRO 2017).

Within the NSW Soil and Land Information database, eSPADE, there is a soil technical report available for a sampling location adjacent to the site boundary, close to the intersection of Yanga Way and Balranald Road. This report indicates that, at the time of sampling, evidence of wind erosion at this location was minor (Eldridge 1981). A slight overall erosion hazard was noted at this location (Eldridge 1981).

## **iii Agricultural production**

The development footprint will be removed from potential agricultural production during the life of the project (in the order of 30 years). This is approximately 1,072.4 ha of LSC Class 6 land and approximately 30.5 ha of LSC Class 4 land. The project has been developed to avoid and minimise land disturbance and overall impacts on agricultural land where possible. This includes the avoidance of the majority of LSC Class 4 land within the site boundary (refer to Figure 6.3). However, as noted in consultation with the landholder, the history of agricultural production on the site has been primarily opportunistic cropping due largely to considerable fluctuations in both rainfall and evaporation rates and limitations with the land capability. In addition, the development footprint has been selected to avoid fragmenting the landholder's residual agricultural land.

Consultation with surrounding landholders and the local community has been undertaken to minimise the impacts of construction on agricultural operations adjacent to the site (refer to Section 5.4). Consultation has also been undertaken with LLS Western in respect of minimising impacts to access to the TSR (refer to Section 5.3).

Consultation with surrounding landholders has confirmed that aerial spraying operations do not generally occur on agricultural land surrounding the site boundary (refer to Section 5.3). The project will likely not pose a risk to any aerial spraying operations in the vicinity of the development footprint due to the low height of the project infrastructure and the limited amount of reflectivity from PV solar panels. A number of different sources indicate that, in general, as little as 2% of the light received is reflected by PV solar panels (NSW DoI-DRE 2016a; Solar Trade Association 2016; FAA 2010). As noted by both the Federal Aviation Administration of the United States (FAA 2010) and Spaven Consulting (2011), this degree of reflectivity is less than the reflectivity produced by a wide variety of different surfaces, including surfaces within the immediate vicinity of the project's development footprint, such as bare soil and vegetation, and is similar to the reflectivity of smooth bodies of water, such as Yanga Lake (Figure 2.2).



#### **iv Biosecurity**

The project may lead to a reduction in biosecurity (ie reduced pest and weed control) due to the temporary significant increase in vehicle movements to and from the site during construction. In addition, pest animals may also be encouraged by food sources from construction works and general disturbance.

As noted in Section 6.2, one noxious weed, declared under the *Noxious Weeds Act 1993*, has been identified in the site boundary, namely African Boxthorn (*Lycium ferocissimum*). A potential indirect impact arising from the project has been identified in the BAR (Appendix D) as further encroachment of invasive exotic weeds species, such as African Boxthorn. There is potential that this will lead to loss of habitat and suppression of native seedling establishment resulting in changes to vegetation communities over time (refer to Appendix D).

#### **v Flooding and water resources**

The site is outside of the 'land subject to inundation extent' defined within the Balranald LEP. The impact of the project on flooding and water resources is addressed in Section 6.9.

#### **vi Mining and minerals**

Consultation with Iluka Resources Limited regarding potential interactions between the project and EL7626 is discussed in Section 5.3. The project will not sterilise extractable resources in EL7626. Exploration activities will be able to continue within areas of EL7626 that are outside the site boundary.

#### **vii Crown land**

The access road and transmission line corridor for the project traverse the TSR, which lies adjacent to the site's eastern boundary (refer to Figure 6.4). This land is legally described as DP 1158277 Lot 7306 and DP 1158277 Lot 7307. These land parcels are outside of the site boundary, but inside the development footprint and infrastructure area for the project. Within these land parcels, the project will result in the disturbance of a total area of no more than approximately 1.89 ha and 0.93 ha, respectively.

Ongoing management and operation of Crown land adjacent to the site boundary has been considered during consultation with LLS-Western, DoI-Lands and Forestry NSW (refer to Section 5.3). The project will not adversely impact the ongoing management and operation of Crown land adjacent to the site boundary.

### **6.5.4 Management and mitigation**

#### **i Construction**

The EMP will address land management and detail measures to minimise impacts to agricultural land with reference to DPI's publication, *Infrastructure proposals on rural land* (Kovac and Briggs 2013). To address the potential impacts of the project on rural land, measures will be implemented during construction. These measures will include:

- a site access protocol will be developed that lists the relevant landholder contact details and includes measures to minimise adverse impacts, such as, driving carefully to minimise disturbance to livestock, crops and pastures;
- the timing of construction and the location/design of temporary access routes (Figure 3.1) will be positioned to minimise impacts on neighbouring agricultural operations;



- access tracks to and from the site will remain accessible to the landholder to avoid any impacts to the operation and sustainability of neighbouring agricultural businesses;
- soil resources will be managed to ensure the future viability of the site for agricultural production, including:
  - optimisation and recovery of useable topsoil and subsoil;
  - establishment of effective soil amelioration procedures; and
  - separate storage of topsoil and subsoil to ensure that soil is replaced in the right order and to avoid unnecessary impacts on soil and existing vegetation structure.

An erosion and sediment control plan in accordance with *Managing Urban Stormwater: Soils & Construction* (Landcom 2004) will be prepared in consultation with BSC and will be implemented and monitored during the life of the project to minimise impacts. This plan will include provisions to:

- install erosion and sediment controls (if required) prior to and during construction;
- regularly inspect erosion and sediment controls, particularly following large rainfall/wind events;
- ensure that all vehicles, plant and equipment leaves the site in a clean condition to avoid tracking of sediment on Yanga Way;
- during excavation, separate topsoils and subsoils to ensure that they are replaced in their natural configuration;
- stockpile topsoil appropriately to minimise weed infestation and maintain soil organic matter, soil structure and microbial activity; and
- minimise the total area of disturbance from excavation and compaction.

The EMP will include weed management protocols and will consider BSC's *Noxious Weeds Policy* (BSC 2005). Weed management protocols will include measures for the identification, management and ongoing monitoring of weeds on the site.

The EMP will include a spill response plan which will be implemented during construction and throughout the project's operational stage to avoid potential for contamination.

## **ii Operations**

During the operational stage of the project, a number of land management and mitigation measures will be implemented to reduce the impact of the project on:

- land and soil capability within the site boundary;
- neighbouring agricultural operations;
- regional biosecurity;
- erosion; and
- surface water runoff.



In consultation with the landholder, land management will include consideration of the viability of sheep grazing as a means of vegetation maintenance throughout the life of the project. Sheep have been successfully employed to manage grassland in solar farm developments both within Australia and overseas (Sibson 2016; BRE 2014). Sheep are considered an appropriate means of managing grassland between and underneath PV solar panels with research suggesting that overall production levels can be maintained at levels sustained on open grassland under similar conditions (BRE 2014). As noted by BRE (2014), solar farm developments cause minimal ground disturbance with project infrastructure typically occupying approximately 5% of the total land area. Subsequently, approximately 95% of the total land area is still accessible for vegetation growth, which can be used to support agricultural activity over the life of a solar farm development.

To mitigate impacts to biosecurity, vehicle movements will be restricted to the formed access tracks. In addition, if implemented, sheep grazing within the site boundary will put pressure on any increases to weed levels while maintaining a multi-purpose land use throughout the life of the project.

- Consideration of ground cover beneath the PV solar panels will be included in the EMP to manage erosion, weed infestation and surface water runoff.
- Depending on the frequency of aerial spraying operations conducted throughout the life of the project, additional cleaning of the PV solar panels may be required to remove any build-up of spray drift and ensure that the yield of the PV solar panels is not reduced. Cleaning of the PV solar panels is discussed in Section 3.6.

The installation of approximately 868,000 PV solar panels may affect the capture and flow of runoff within the site. To avoid run off being concentrated along the lower edge of the PV solar panel arrays, gaps will be maintained between each PV solar panel. Once operational, and following heavy rainfall/wind events, monitoring will be undertaken to determine whether any additional erosion and sediment control measures are required in response to the potential impact of runoff from the PV solar panels on soil erosion.

### iii Decommissioning

As noted in Section 3.7, once the project reaches the end of its investment and operational life, the project infrastructure will be decommissioned and the site returned to its pre-existing land use, or other land use in consultation with the landholder, as far as practicable.

During decommissioning, all above ground facilities will be removed from the site. This will involve the removal and recycling of the materials on site including:

- PV solar panels and mounting frames;
- metals from posts and cabling; and
- all other equipment including inverters and the onsite substation.

During construction, the on-site electrical collection systems will be placed underground in standard electrical conduit trenches of approximately 600 to 1,200 mm in depth. As part of decommissioning, these cables may be left *in situ* to avoid unnecessary ground disturbance. As noted in Table 6.8, the land and soil capability within the majority of the development footprint is recognised as having very severe limitations and is suitable for low intensity land uses. At this depth, only deep-rooting trees, such as those associated with horticultural practices, would be likely to disturb the electrical conduit trenches and their respective cabling (Burgess et al. 2008).



Due to the limitations of the land within the majority of the development footprint, horticultural practices involving deep-rooting trees are unlikely to be a viable future land use; as such, it is unlikely that cables, if left in-situ, would impinge on any future agricultural production within the development footprint. The access tracks within the site boundary may be retained if requested by the landholder at the time of decommissioning.

- A site decommissioning plan will be prepared following the completion of project construction and commissioning and will feature rehabilitation objectives and strategies for returning the site to agricultural production. The plan will include:
- an outline of the methods used to remove infrastructure at the end of the project's operational life;
- disposal options for infrastructure once it has been removed; and
- a soils sampling plan to validate the health of the soil resource within the site boundary to inform restoration objectives to restore the land to its former LSC classification (if required).

The plan will also establish specific timelines for each of the activities outlined above.

### **6.5.5 Conclusion**

The project has been developed to avoid and minimise land disturbance and overall impacts on agricultural land. Throughout the life of the project, soil resources will be managed with consideration of the future viability of the site for agricultural production. In addition, an EMP will be implemented to mitigate the potential impacts of the project on the land within the site boundary.

## **6.6 Visual**

### **6.6.1 Introduction**

The SEARs require an assessment of the potential visual impacts of the Limondale Sun Farm. The SEARs state that this EIS must include:

an assessment of the likely visual impacts of the development (including any glare, reflectivity and night lighting) on surrounding residences, scenic or significant vistas, air traffic and road corridors in the public domain, including a draft landscaping plan for on-site perimeter planting (particularly along Yanga Way), with evidence it has been developed in consultation with affected landowners

EMM has prepared a visual impact assessment for the project (Appendix F). This section of the EIS summarises the visual impact assessment and addresses the SEARs requirements for potential visual impacts.

### **6.6.2 Existing environment**

As noted in Section 2.1, the site has been highly modified by previous and current land uses, including land clearing, cropping, and livestock grazing. It is currently used for broad acre cropping, most recently hay. Photos illustrating the general condition of the site are provided in Chapter 2.

The site is within the Murrumbidgee catchment's flat western plains, south of the Murrumbidgee River. Elevation across the site varies, ranging between 6270 m above sea level, with elevation generally increasing from north to south.

The site is in a semi-rural setting, with the wider region characterised by grazing and cropping properties, large-scale farm businesses, conservation areas, forestry (including a forest logging business approximately 5 km north



of the site and timber reserve within the TSR), scattered rural residences, Balranald township and major transport routes such as the Sturt Highway. The majority of land surrounding the site is zoned RU1 Primary Production under the Balranald LEP (and Wakool LEP east of Yanga Way) (Figure 2.2).

As noted in Chapter 2, the site's eastern boundary is adjacent to a parcel of Crown land that extends north and south (Figure 6.4). Yanga Way runs through this Crown land and Transgrid's Balranald Substation is within this Crown land (Figure 6.4). Other prominent features in the surrounding landscape, such as Transgrid's 220 kV transmission line, Yanga National Park and Murrumbidgee Valley State Conservation Area are identified in Figure 2.1.

No notable scenic or significant vistas within proximity of the site have been identified.

### 6.6.3 Impact assessment

#### i Project design

The site location, capacity of the project, design and layout of infrastructure and connection to the electricity grid have been refined through an evaluation process both prior to and during preparation of the visual impact assessment and this EIS. Specifically, the parcels of land which comprise the development footprint and the placement of infrastructure including PV solar panels, inverters, electrical collection system and switchyard and easement and connection infrastructure have been identified through detailed consultation with the landholder, to minimise visual impacts and land use conflicts and enable agricultural production and land management practices to continue on surrounding land.

#### ii Viewpoint selection

A visual assessment was conducted from a number of representative viewpoints surrounding the site and development footprint. The viewpoints were selected to represent views close to sensitive receptors and road corridors (ie Yanga Way and Windomal Road) nearest to the site. The locations of the eight viewpoints are illustrated in Figure 6.5. The rationale for the selection of each of the viewpoints analysed are summarised in Table 6.9.

**Table 6.9 Assessed viewpoints and sensitive receptors**

Assessment location	Viewpoint type	Rationale for selection
Viewpoint 1	Dwellings	Views are representative of sensitive receptors (ie dwellings) to the south of the site (see Figure 2.1), including: R5 – 3 km; and R6 – 4.7 km. This location has also been identified as the main entrance for the proposed Sunraysia Solar Farm.



**Table 6.9 Assessed viewpoints and sensitive receptors**

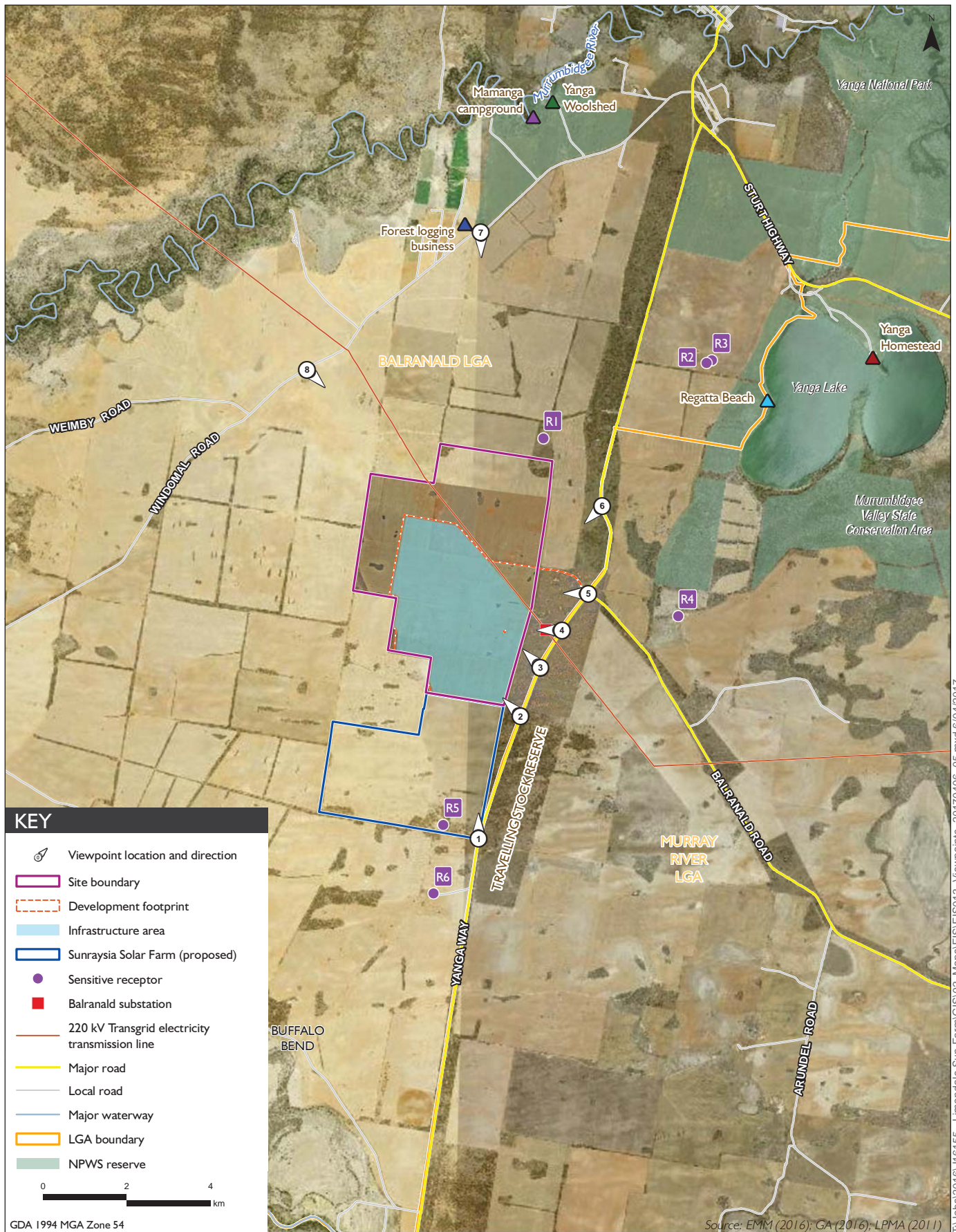
Assessment location	Viewpoint type	Rationale for selection
Viewpoint 2 Viewpoint 3 Viewpoint 4 Viewpoint 5 Viewpoint 6	Motorist	Views are representative of those experienced by motorists travelling along Yanga Way. These viewpoints were selected on the basis that motorists travelling along Yanga Way at these locations may experience limited views of project infrastructure. Daily traffic estimates indicate that between 396 and 596 vehicles travel along Yanga Way per day (refer to Section 6.8 and Appendix H). Views from Viewpoint 5 are also representative of those experienced by stationary motorists waiting to exit Balranald Road and turn left or right on to Yanga Way (Figure 6.5). This location is approximately 150 m north of the proposed site access for the project. The existing traffic movements using the intersection from the Balranald Road direction are not known but are assumed to be approximately 100 daily vehicle movements (refer to Section 6.8 and Appendix H).
Viewpoint 7	Motorist Industry Dwellings	Views are representative of those experienced by motorists travelling along Windomal Road, north of the site. This viewpoint was selected on the basis that motorists travelling along this road corridor may experience limited views of project infrastructure. The existing traffic movements using Windomal Road are not known but are assumed to be approximately 100–200 daily vehicle movements. This location is approximately 200 m east of the forest logging business north of the site (refer to Figure 2.1). This location is also representative of views from two sensitive receptors outside of the 5 km radius considered as part of the visual assessment.
Viewpoint 8	Motorist	Views are representative of those experienced by motorists travelling along Windomal Road, north-west of the site. This viewpoint was selected on the basis that motorists travelling along this road corridor may experience limited views of project infrastructure. The existing traffic movements using Windomal Road are not known but are assumed to be approximately 100–200 daily vehicle movements.

To determine potential visibility of project infrastructure, a viewshed analysis was also completed. The results of the viewshed analysis are presented in Figure 6.6. The viewshed analysis simulates the effects of existing vegetation (based on aerial imagery and ground-truthing) and topography on screening views. The results of the viewshed analysis indicate that the project infrastructure may be visible from viewpoints 4, 5, 6 and 8.

### iii Construction impacts

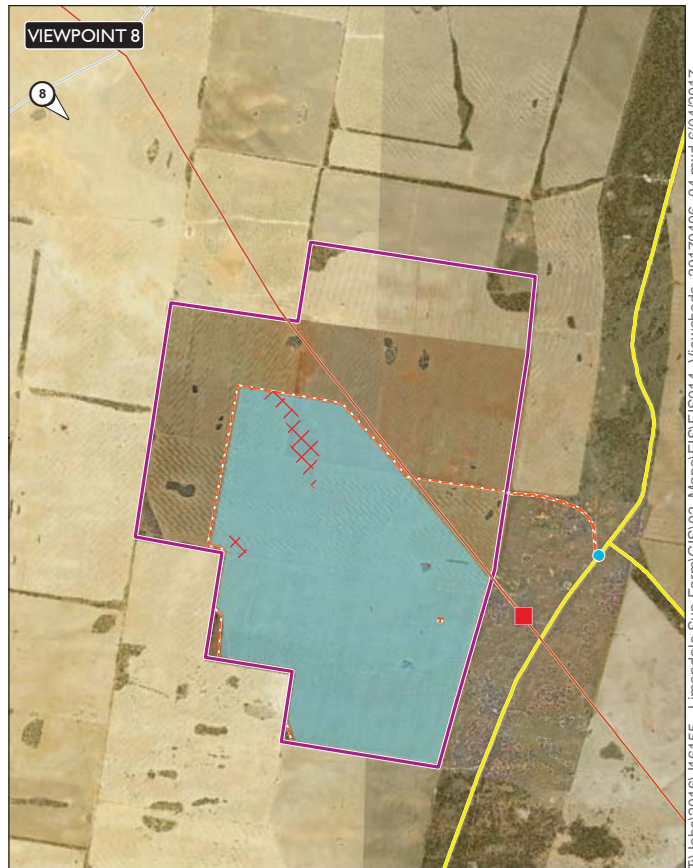
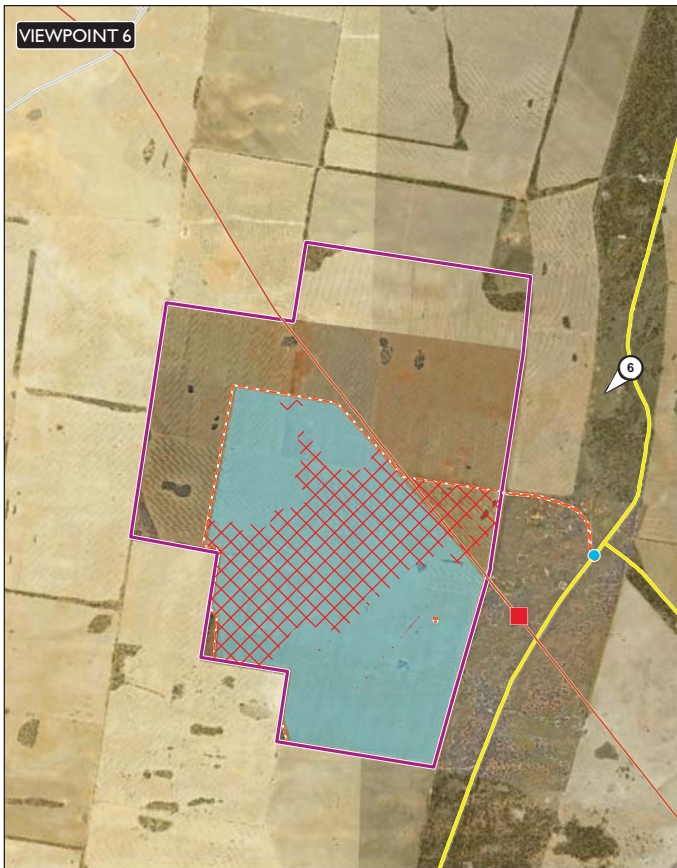
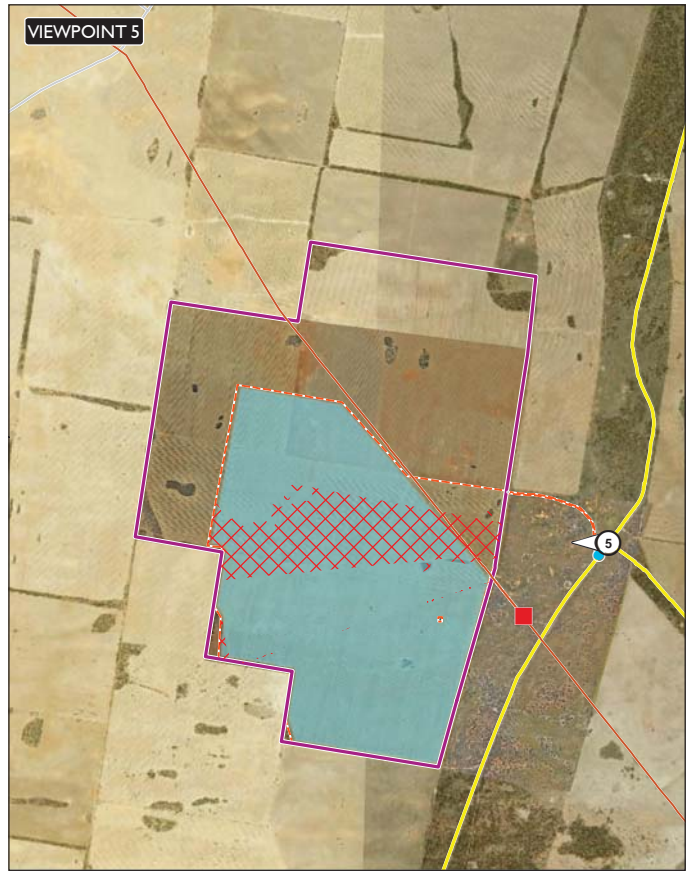
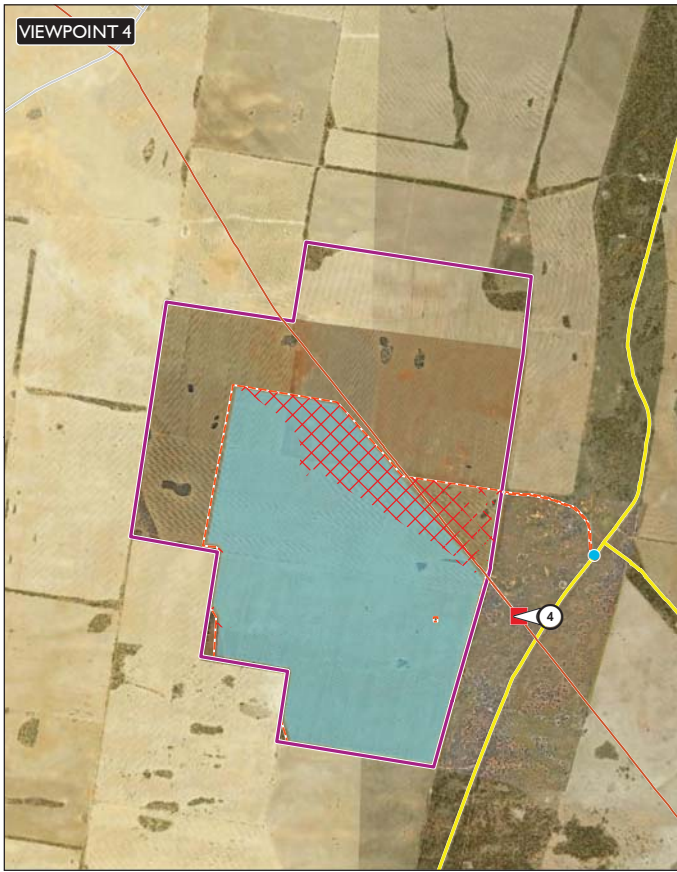
During construction, the landscape within the development footprint will undergo physical change, namely through the installation of project infrastructure, which will add new features to the visual landscape. Views of the site during construction will be predominantly from motorists travelling along Yanga Way. Yanga Way is approximately 500 m from the site boundary at its nearest point, with the TSR providing a vegetated buffer between the site and motorists. At its furthest point, to the north, the distance between Yanga Way and the site is around 1.5 km. Furthermore, it is assumed the focus of motorists will be the direction of travel along Yanga Way.

Any changes to the visual landscape during construction are not considered significant due to the presence of substantial screening vegetation within the TSR, the distance between Yanga Way and the site, the low visual sensitivity of passing motorists and the temporary nature of construction activities.



### Viewpoint locations

Limondale Sun Farm  
 Environmental impact statement  
 Figure 6.5



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**KEY**

Site boundary	Proposed site access	Major road	Viewpoint location and direction
Development footprint	Balranald substation	Local road	
Infrastructure area	220 kV electricity transmission line	Modelled visible areas within the development footprint from viewpoint	

Source: EMM (2017); GA (2016); LPMA (2011)

0 1 2 km  
GDA 1994 MGA Zone 54

Viewshed analysis within the development footprint from selected viewpoints

Limondale Sun Farm  
Environmental impact statement

Figure 6.6





#### iv Operation impacts

A summary of the results of the assessment of visual impacts for each of the eight viewpoints is provided in Table 6.10.

**Table 6.10 Summary of results of visual impacts at each viewpoint**

Viewpoint	Distance to site	Project infrastructure visible based on viewshed analysis?	Magnitude of change	Visual sensitivity	Evaluation of significance	Significant impact?	Additional mitigation required?
Viewpoint 1	3 km	No	Negligible	Moderate	Slight	No	No
Viewpoint 2	0.5 km	No	Negligible	Low	Negligible	No	No
Viewpoint 3	0.6 km	No	Low	Low	Slight	No	No
Viewpoint 4	0.9 km	Yes	Low	Low	Slight	No	No
Viewpoint 5	1.3 km	Yes	Moderate	Low	Slight/moderate	No	No
Viewpoint 6	1.3 km	Yes	Moderate	Low	Slight/moderate	No	No
Viewpoint 7	5.3 km	No	Negligible	High	Slight	No	No
Viewpoint 8	3 km	Yes	Low	Low	Slight	No	No

The undulating nature of the surrounding landscape and presence of dune crests within the landscape, as well as stands of both scattered and more dense vegetation between the site and most viewpoints, means that views to the site are typically at least partially obstructed from most locations, with the exception of views of the site from parts of Yanga Way and Windomal Road.

As part of the visual impact assessment, Viewpoint 5 was selected for preparation of a photomontage. Photomontages enable potential visual changes from a viewpoint to be illustrated on a photograph, with the objective of simulating the visual extent of project infrastructure, once constructed. Viewpoint 5 was selected as it is representative of viewers on both Yanga Way and Balranald Road, and project infrastructure is predicted to be visible based on the results of the viewshed analysis (Figure 6.6).

The existing view from Viewpoint 5 is shown in Photograph 6.1 and the photomontage is shown in Photograph 6.2. The photomontage conservatively assumes the height of the project infrastructure will be 3 m, which is more than double the average height of the dominant project infrastructure, namely the PV solar panels (refer to Section 3.4.1). Consequently, it is assumed that the actual visible extent of project infrastructure from Viewpoint 5 will be significantly less than the area highlighted in white shading in Photograph 6.2.

Each of the six sensitive receptors represented by the viewpoints (Figure 6.5) are shielded from views of the project infrastructure to some degree by stands of vegetation surrounding dwellings, remnant vegetation and/or undulating topography.

During the site surveys, observations made from Regatta Beach, Yanga Homestead, Yanga Woolshed and Mamanga campground confirmed that the undulating nature of the surrounding landscape, scattered and dense vegetation between the site and these locations, and distance from the site would completely obstruct views of the site and project infrastructure from each of these locations.



**Photograph 6.1** Viewpoint 5 – Existing view near Yanga Way/Balranald Road intersection



**Photograph 6.2** Viewpoint 5 – Potential visible extent of project infrastructure



## **v Reflectivity and glare**

A number of different sources indicate that, in general, as little as 2% of the light received is reflected by PV solar panels (NSW DoI-DRE 2016a; Solar Trade Association 2016; FAA 2010).

The potential impacts of reflectivity on sensitive receptors, primarily motorists travelling along Yanga Way and Windomal Road, are glint and glare. Glint refers to shorter period and more intense levels of exposure, while glare refers to sustained or continuous periods of exposure to excessive brightness, but at a reduced level of intensity (Morelli 2014). The amount of glint and glare produced by a PV solar panel is variable and dependent on the angle of the panels, with lower angles producing less glint and glare (Morelli 2014). As described in Chapter 3, the project's PV solar panels will be constructed in a single axis tracking configuration. This configuration will allow the PV solar panels to rotate from east to west during the day tracking the sun's movement. Consequently, the degree of glint and glare experienced by sensitive receptors will be variable depending on the time of day and viewing location.

The Balranald Airport is approximately 16 km north of the site (Figure 2.1) with the runway positioned in an approximate north-south orientation. Due to the distance between the Balranald Airport and the site, it is unlikely that aircraft using this facility will pass directly over the site during the critical phases of flight, namely approach and landing (Spaven Consulting 2011). OVERLAND consulted with CASA during the preparation of the visual impact assessment to discuss the potential impact of the project on flights to and from the Balranald Airport. As part of this consultation, CASA confirmed that it is unlikely that the project infrastructure will impact pilot's sight during the critical phases of flight. Further, CASA did not consider the project to be a hazard to aviation (see Section 5.3).

The potential for low angled reflected sunlight to cause a distraction to drivers travelling either north or south along Yanga Way, or west along Balranald Road were considered as part of the traffic impact assessment for the project (refer to Section 6.8 and Appendix H). Additional vegetation screening was not considered to be necessary, given the minimum distances of approximately 500 m to the nearest PV solar panel from vehicles travelling along Yanga Way, and the significant existing vegetation screening within the TSR along the western side of Yanga Way (Figure 2.1).

Based on the findings of previous assessments prepared for PV solar energy facilities, glint and glare from the project's PV solar panels are not expected to significantly impact the following:

- sensitive receptors within the vicinity of the site;
- people engaged in agricultural activities in the surrounding landscape;
- motorists travelling along the major road corridor of Yanga Way;
- motorists travelling along the local road corridor of Windomal Road;
- motorists travelling along a number of minor unsealed rural property access roads and farm tracks; and
- aircraft arriving at or departing from the Balranald Airport.



#### **6.6.4 Management and mitigation**

The project infrastructure is described in detail in Chapter 3. Development of the project design has included general measures to reduce the degree of contrast between the project and the surrounding rural landscape, having regard to the form, scale, height, colour and texture of materials incorporated as part of the project's infrastructure. All of these amendments have reduced the overall visual impacts. The visual impact assessment has led to further refinement of the project to reduce visual impacts through consultation with surrounding landholders (refer to Section 5.3).

##### **i Colour of materials**

Suitable colours will be chosen for project infrastructure to minimise visual impacts. Buildings and materials for site amenities will be made from colourbond or similar. These buildings and materials will be designed to be consistent with the local farming landscape and will be similar to existing farm buildings located in the surrounding area.

##### **ii Night lighting**

Localised night lighting may be required during general maintenance activities conducted during the operation stage of the project. If required, lighting will be motion-activated and will be linked with security cameras, which will be positioned in strategic locations around the perimeter of the site. The use of motion-activated lighting will minimise impacts on surrounding areas. All night lighting will comply with *Australian Standard AS4282 (INT) 1997 – Control of Obtrusive Effects of Outdoor Lighting*.

##### **iii Reflectivity and glare**

During consultation, CASA recommended that an anti-glare coating be applied to the PV solar panels to minimise potential residual glare. As noted in Chapter 3, the panel designs considered for the project, feature anti-reflective surface treatment.

#### **6.6.5 Conclusion**

The project will not have significant adverse visual impacts on the locality.

Eight viewpoints have been assessed to demonstrate the visual impacts of the project. Due to existing mature vegetation, variable elevation and undulation in the landscape, and the relatively low height of the dominant project infrastructure, namely the PV solar panels, the project's infrastructure will be relatively shielded from view at the majority of the viewpoints assessed as part of the visual assessment. Subsequently, a landscaping plan for on-site perimeter planting is not considered necessary.

The project design, development footprint and placement of infrastructure have progressively evolved to minimise or avoid visual impacts. Nonetheless, the development of the project will result in some changes to the landscape. Visual impacts will occur during the construction and operational stages of the project. The visual landscape will be altered from its current state for the duration of the operational stage of the project. The visual assessment determined that, of the viewpoints assessed, infrastructure may be visible from four viewpoints; viewpoints 4, 5, 6 and 8. The distance of the development footprint from these viewpoints ranges from 0.9 km to 5.3 km. Based on the presence of vegetation and topography, combined with the relatively low height of the project's infrastructure and distance, visual impacts will be minimal.



## **6.7 Noise and vibration**

### **6.7.1 Introduction**

The SEARs require an assessment of the potential impacts of the Limondale Sun Farm project on noise. The SEARs state that this EIS must include:

an assessment of the construction noise impacts of the development in accordance with the Interim Construction Noise Guideline (ICNG) and sub-station noise impacts in accordance with the NSW Industrial Noise Policy (INP), and a draft noise management plan if the assessment shows construction noise is likely to exceed applicable criteria.

EMM has prepared a noise and vibration impact assessment for the project (Appendix G). This section of the EIS summarises the assessment and addresses the SEARs requirements for potential noise impacts.

### **6.7.2 Existing environment**

#### **i Ambient noise**

The nearest sensitive receptor (ie dwelling), R1, is approximately 2.9 km north of the development footprint, with a further five (R2-R6) within approximately 6 km (see Figure 6.7). Sensitive receivers are referred to as assessment locations for the purposes of the noise assessment. Land uses are primarily agricultural, as described in Chapter 2. No other sensitive land uses have been identified around the project.

Given the area and surrounding agricultural land uses, existing ambient noise levels at assessment locations are expected to be low (30 dB or below). Therefore, the INP minimum rating background noise level (RBL) of 30 dB has been adopted for all assessment locations for the purposes of the assessment.

#### **ii Meteorology**

Noise propagation over distance can be significantly affected by the prevailing weather conditions. Of most interest are source to receiver winds as these conditions can enhance received noise levels.

Meteorological data from the nearest BoM Automatic Weather Station (AWS) was analysed. The analysis identified no feature winds for the area during the day, evening or night periods and therefore only calm meteorological conditions were adopted for the construction noise modelling.

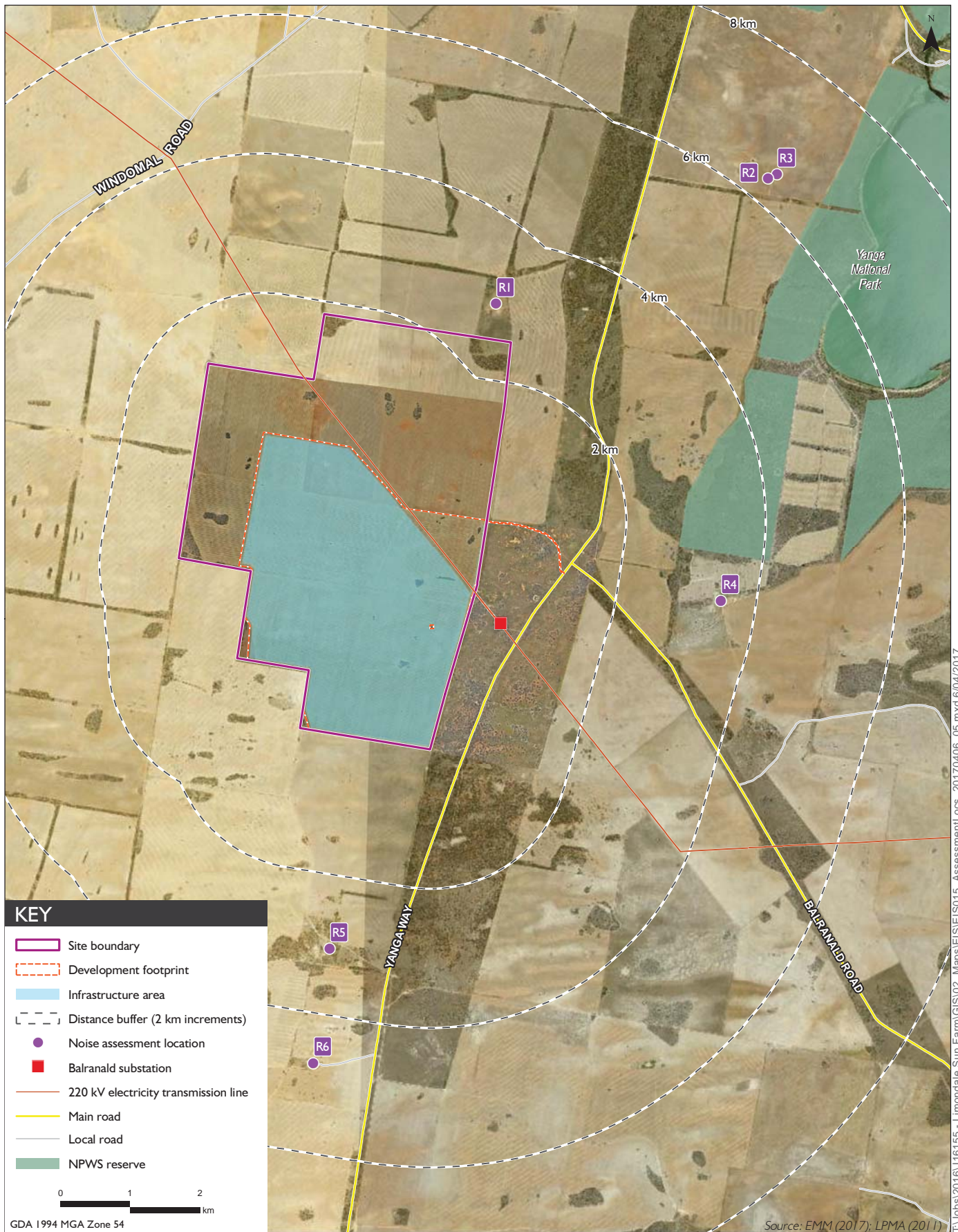
### **6.7.3 Impact assessment**

#### **i Noise criteria**

##### **a. Construction noise criteria**

The ICNG (EPA 2009) sets out noise management levels (NMLs) for residential and other noise-sensitive receivers and how they are to be applied.

The construction NMLs for this assessment have been based on the adopted INP minimum RBL of 30 dB in accordance with the ICNG (EPA 2009). The policy suggests restrictions to the hours of construction that apply to activities that generate noise at residences above the 'highly affected' NML. The NMLs are shown in Table 6.11.



**Noise assessment locations**  
 Limondale Sun Farm  
 Environmental impact statement  
 Figure 6.7



**Table 6.11 Construction noise management levels**

Assessment locations	Period	Adopted RBL, dB(A)	NML, $L_{Aeq(15-min)}$ (RBL + 10 dB)
R1-R6	Standard hours <sup>1</sup>	30	40 75 (highly affected)

Notes: 1. Standard hours as per the ICNG are Monday to Friday from 7 am to 6 pm, Saturday from 8 am to 1 pm, no work on Sundays and public holidays.

**b. Road traffic noise criteria**

The principal guidance for assessing the impact of road traffic noise on receivers is the NSW EPA's *Road Noise Policy* (RNP) (DECCW 2011).

The site will be accessed from Yanga Way, with most traffic originating from the south of the site, and a smaller portion from the north (from the Sturt Highway). The sections of the Sturt Highway and Yanga Way leading to the site are classified as a freeway and an arterial road, respectively. Table 6.12 presents the road traffic noise assessment criteria for these road categories and are reproduced from Table 3 of the RNP (DECCW 2011).

**Table 6.12 Road traffic noise assessment criteria for residential land uses**

Road category	Type of project/development	Assessment criteria, dB(A)	
		Day (7 am to 10 pm)	Night (10 pm to 7 am)
Freeway/arterial/sub-arterial roads	Existing residences affected by additional traffic on existing freeway/arterial/sub-arterial roads generated by land use developments.	$L_{eq(15-hr)}$ 60 (external)	$L_{eq(9-hr)}$ 55 (external)

Additionally, the RNP states that where existing road traffic noise criteria are already exceeded, any additional increase in total traffic noise level should be limited to 2 dB.

**ii Construction noise assessment**

Construction noise levels were modelled using Brüel and Kjær Predictor software. 'Predictor' calculates total noise levels at assessment locations from the concurrent operation of multiple noise sources. The model has considered factors such as: location, distance, ground effects, atmospheric absorption, topography, and applicable meteorological conditions. Predicted noise levels over a typical worst case 15-minute scenario were modelled and assessed for comparison against the relevant NMLs. The construction noise impact assessment has adopted sound power levels from the EMM noise database for plant and equipment items used on similar projects. Plant and equipment items, sound power levels and quantities adopted in the noise modelling are provided in Appendix G.

Modelling results indicate site preparation works have the most potential for noise impacts.



Predicted construction noise levels for the site preparation works during standard construction hours are presented in Table 6.13. Site preparation works are predicted to satisfy the recommended NMLs at all assessment locations. Therefore, noise levels during all other construction activities are expected to satisfy the NMLs at all assessment locations.

**Table 6.13 Construction (site preparation) noise predictions**

Assessment locations	Land use	Predicted construction noise level LAeq (15-min), dB		Construction noise management level LAeq (15-min), dB	
		Calm	Standard hours <sup>1</sup>		
R1	Residential	34		40	
R2	Residential	<30		40	
R3	Residential	<30		40	
R4	Residential	<30		40	
R5	Residential	<30		40	
R6	Residential	<30		40	

### iii Road traffic noise assessment

The proposed construction works will generate traffic movements associated with the movement of the construction workforce as well as the delivery of all construction materials by road trucks. Daily average (and peak) traffic movements during construction are summarised in Table 6.14.

**Table 6.14 Daily average traffic movements during construction**

Construction scenario	Daily heavy vehicles movements	Daily workforce movements (light vehicles)	Total daily movements	Peak hourly workforce movements (light vehicles)	Peak hourly heavy vehicle movements	Total peak hourly movements
Average	24	180	204	45	4	49
Peak	43	400	443	100	6	106

On Yanga Way, the nearest residential facade that could potentially be affected by an increase in road traffic noise is set back approximately 45 m from the road in a 100 km/h speed zone. This residence is approximately 17 km south of the site boundary, close to the town of Kyalite (refer to Figure 6.8). On other parts of the route and further away from the project (towards Swan Hill, approximately 80 km south of the project, or Hay, approximately 130 km east of the project), nearest residential facades are set back approximately 15 m and 20 m (or greater) from the road in a 50 km/h and 100 km/h speed zone, respectively. These distances have been adopted for the road traffic noise assessment. Road traffic noise results are based on the peak hourly workforce movements and construction delivery movements during the peak construction scenario and hence this assessment of road traffic noise is therefore considered to be conservative.

Traffic volumes for 2017 were calculated for Yanga Way (towards Swan Hill) and the Sturt Highway (towards Hay) using data from RMS and assuming a 1% annual traffic growth (linear) for both roads (refer to Section 6.8 and Appendix H).

Road traffic noise levels during construction works are predicted to be below the relevant criteria at the affected sensitive receptors on roads north and south of the site, as shown in Table 6.15.



**Table 6.15 Predicted road traffic noise during construction**

Stage	Road	Distance to road (m)	Speed (km/h)	Existing traffic noise level, $L_{Aeq,period}$ , dB	Site generated traffic noise level, $L_{Aeq,period}$ , dB <sup>1</sup>	Future traffic noise level, $L_{Aeq,period}$ , dB	Criteria, $L_{Aeq,period}$ , dB
Peak	Yanga Way	≥45	100	51	50	54	60
		≥20	100	55	54	58	60
	Sturt Highway	≥300	100	45	37	46	60
		≥15	50	57	48	58	60

**iv Operational noise impacts**

Noise impacts during operation of the project were considered at all six assessment locations. Assessment of potential impacts from operational noise identified that the  $L_{Aeq(15-min)}$  noise levels from the proposed development would be well below (<30 dB) the minimum INP criterion of 35 dB during worst case assessable meteorological conditions. Therefore, no impact is anticipated during the operational stage of the project.

**v Vibration assessment**

The majority of vibration-generating activities associated with the proposed construction works use a roller and a piling drill rig. As a guide, safe working distances for typical items of vibration intensive plant are listed in Table 6.16. The safe working distances are quoted for both ‘Cosmetic Damage’ (refer to British Standard BS 7385) and ‘Human Comfort’ (refer to British Standard BS 6472-1).

**Table 6.16 Recommended safe working distances for vibration intensive plant**

Plant item <sup>1</sup>	Rating/description	Safe working distance	
		Cosmetic damage (BS 7385)	Human response (BS 6472)
Vibratory Roller	<50 kN (typically 1–2 tonnes)	5 m	15 to 20 m
	<100 kN (typically 2–4 tonnes)	6 m	20 m
	<200 kN (typically 4–6 tonnes)	12 m	40 m
	<300 kN (typically 7–13 tonnes)	15 m	100 m
	>300 kN (typically 13–18 tonnes)	20 m	100 m
	>300 kN (>18 tonnes)	25 m	100 m
Small hydraulic hammer	(300 kg - 5 to 12 tonne excavator)	2 m	7 m
Medium hydraulic hammer	(900 kg - 12 to 18 tonne excavator)	7 m	23 m
Large hydraulic hammer	(1,600 kg - 18 to 34 tonne excavator)	22 m	73 m
Vibratory pile driver	Sheet piles	2 m to 20 m	20 m
Pile boring	≤800 mm	2 m (nominal)	N/A
Jackhammer	Hand held	1 m (nominal)	Avoid contact with structure

The nearest sensitive receptor is approximately 2.9 km from the development footprint and PV solar panel arrays. Given these distances are well outside the safe working distance for cosmetic damage and human comfort, it is therefore anticipated that impact is highly unlikely to occur from the proposed construction works.



#### **6.7.4 Cumulative noise impacts**

Sunraysia Solar Farm Two Pty Ltd is seeking to develop the Sunraysia Solar Farm immediately south of the site. The construction of the Sunraysia Solar Farm has the potential to occur at the same time as that of the project. The Sunraysia Solar Farm EIS predicted construction  $L_{Aeq(15-min)}$  noise levels of 32 dB or less at the nearest residential receiver. Using these predictions for the Sunraysia Solar Farm and predicted levels for the project, the total cumulative noise level from both developments would still satisfy the NMLs (40  $dB_{LAeq(15-min)}$ ) during standard hours at the assessment locations. Therefore, cumulative noise from the project and the Sunraysia Solar Farm is not anticipated to cause an impact at nearby identified sensitive receivers.

Further, there is potential for cumulative road traffic movements from both the project and the Sunraysia Solar Farm, resulting in road traffic noise. The cumulative assessment of road traffic noise predicts that it is unlikely that traffic generated during the construction stage of both developments would result in exceedances of the relevant criteria.

#### **6.7.5 Management and mitigation**

The noise and vibration impact assessment predicts that impacts are not likely to be significant during construction or operation of the project, nor would the project result in impacts to road traffic noise or cumulative noise and vibration during construction. Therefore based on the results of the noise and vibration impact assessment, no specific mitigation or management measures are required.

#### **6.7.6 Conclusion**

Given the significant separation distance between the site and the nearest assessment locations, the potential construction and operation noise levels are predicted to be below relevant criteria. Road traffic noise levels inclusive of project-related traffic are predicted to achieve the relevant noise goals at the nearest sensitive receptors. Vibration associated with the proposed construction works is highly unlikely to generate impacts at the nearest vibration-sensitive receivers. Additional noise management and mitigation measures are not predicted to be required to achieve the relevant operational or construction noise goals.

### **6.8 Traffic and transport**

#### **6.8.1 Introduction**

The SEARs require an assessment of the potential impacts of the Limondale Sun Farm project on traffic and transport. The SEARs state that this EIS must include:

an assessment of the site access route, site access point, rail safety issues and likely transport impacts of the development on the capacity, condition, a description of the measures that would be implemented to mitigate any impacts during construction, and a description of any proposed road upgrades developed in consultation with the relevant road and rail authorities (if required).

EMM has prepared a traffic impact assessment for the project (Appendix H). This section of the EIS summarises the assessment and addresses the SEARs requirements for potential traffic and transport impacts.



## 6.8.2 Existing environment

### i Road network

As described in Section 2.3, the three roads that would primarily be used by the project are Yanga Way, the Sturt Highway and Stony Crossing Road. The existing road network is shown in Figure 6.8.

Yanga Way is a state funded main road, which connects between the Sturt Highway, 1 km south of Balranald and the Murray Valley Highway and Mallee Highway within Victoria, crossing the Murray River at the bridge at Tooleybuc (NSW). The Sturt Highway is a major NSW state highway, which connects from the Balranald area to Buronga/Mildura and the Silver City Highway in the west and travels through Hay and several other major townships in the east to Wagga Wagga, where it connects to the Hume Highway.

Stony Crossing Road is a local road which connects from Yanga Way, near Kyalite, approximately 20 km south of the site, to Swan Hill in Victoria. This route may be used by project traffic travelling to and from the direction of Swan Hill.

Balranald Road is a nearby local road which is generally unsealed and not anticipated to be a major transport route for the proposed project traffic.

The speed limit on Yanga Way is 100 km/hr in the vicinity of the site. On the Sturt Highway, the speed limit is generally 110 km/hr on the rural sections, with lower speed limits (50 km/hr on some sections) through the township of Balranald.

### ii Traffic volume

Baseline daily traffic volumes for the affected roads (project access routes) have been determined primarily using published RMS daily traffic surveys, for the years between 2006 and 2012. To establish a baseline year 2017 daily traffic volume, +1% annual (linear) traffic growth has been added to the year 2010 survey. Traffic volumes are presented in Table 6.17.

**Table 6.17** Historic and projected daily vehicle volumes

Road	Historic daily traffic volumes			2017 projected daily traffic volume <sup>3</sup>	Average proportion of heavy vehicles
	2006	2010	2012		
Yanga Way <sup>1</sup>	575	559	568	596	29%
Sturt Highway, east of Yanga Way	999	1,050	1,031	1,083	45%
Stony Crossing Road, south east of the Yanga Way intersection towards Swan Hill	245	276 <sup>2</sup>	-	295	22%

Notes: 1. At most locations between Stony Crossing Road and the Sturt Highway.  
2. Based on doubling the surveyed volume in one direction only.  
3. Assumes +1% annual (linear) traffic growth, which gives a growth factor x 1.05 the 2012 volumes.





Traffic volume survey data is also available from a road pavement condition survey which was conducted on several major roads in the Balranald area (Aurecon 2014). These additional traffic volume surveys correspond to the following growth adjusted baseline year 2017 daily traffic volumes.

- Sturt Highway, west of Yanga Way – 1,520 daily vehicles; and
- Yanga Way, south of Stony Crossing Road – 396 daily vehicles.

Road width design standards for low volume (generally rural) roads are defined by the Austroads *Guide to Road Design* (Austroads 2010) and are based on daily traffic volumes. The current design standards applicable to the major roads are presented in Table 6.18.

**Table 6.18 Daily traffic volumes and corresponding design standards**

Daily traffic volume	Austroads (2010) design standard	Applicable roads	Meets design standard?
0–150	Single lane sealed, however unsealed dual lane is also generally acceptable, based on other historic standards (eg NAASRA 1984)	Balranald Road	Yes
150–500	Austroads requires a 6–7 m wide seal (7 m wide if more than 15% heavy vehicles)	Stony Crossing Road and Yanga Way (southern section) south of Stony Crossing Road	Yes
500–1,000	Austroads requires a 7–8 m wide seal	Yanga Way (northern section) north of Stony Crossing Road	Yes
1,000–3,000	Austroads requires a 9 m wide seal	Sturt Highway rural sections to the east and the west of Balranald	Yes

The roads surrounding the site each have acceptable road cross sections which meet the Austroads (2010) road design standard for the daily traffic volumes using each route. In most cases there is also a reasonable margin of spare traffic capacity to accommodate significant daily traffic increases, without requiring any increase to the design standard of the route.

### iii Safety

Traffic safety conditions at the intersection of Yanga Way with Balranald Road, near the site access intersection, are currently very good, with excellent intersection visibility in both directions along Yanga Way.

The accident history for the five year period 2011-2015 from the Transport for NSW (TfNSW) interactive accident history database indicates a total of four recorded traffic accidents for an approximately 50 km section of Yanga Way (between the Sturt Highway and Tooleybuc) over the period. This represents an acceptable safety record for the route.

Sections of road pavement along Yanga Way have been resurfaced and widened over the past five years, such that the route length now has a sealed width of at least 7 m and the road centre line and edge lines are also marked along the entire route length.

On Stony Crossing Road, there were two recorded accidents over the same five year period. This also represents an acceptable safety record. Stony Crossing Road had a lower daily traffic volume which is approximately half that of most of the Yanga Way route. Stony Crossing Road also has a relatively straight and level alignment over the majority of the route length, which provides good traffic safety conditions.



### 6.8.3 Impact assessment

#### i Traffic generation and distribution

The following generated daily traffic movements and corresponding vehicle types have been calculated for the average construction, peak construction and operations stage activities for the project (Table 6.19).

**Table 6.19 Additional daily and hourly traffic volumes generated by the project**

Project stage	Average construction (daily traffic)	Average construction (peak hourly traffic)	Peak construction (daily traffic)	Peak construction (peak hourly traffic)	Project operations (daily traffic)	Project operations (peak hourly traffic)
Workforce (car) traffic movements	180	45	400	100	14	4
Delivery (truck) traffic movements	24	4	44	6	6	2
<b>Total site traffic movements</b>	<b>204</b>	<b>49</b>	<b>444</b>	<b>106</b>	<b>20</b>	<b>6</b>

The proposed transport routes for car and heavy vehicle traffic were considered. Approximately 40% of the project generated car traffic is expected to travel to and from the north via Yanga Way and 20% of the project generated truck traffic would also travel to and from this direction via Yanga Way and other routes such as the Sturt Highway, east or west of Balranald.

The major proportions of the project generated car and truck traffic (60% and 80% respectively) are expected to travel to and from the south via Yanga Way or Stony Crossing Road. The project car traffic would be expected to travel to and from the direction of Swan Hill, which is a major population centre in the region. Significant proportions of the project truck traffic would be expected to travel further, likely from the Melbourne area.

#### ii Capacity

The effective current daily traffic capacities for the various roads were considered, according to the current Austroads 2010 Road Design Guide standards are given in Table 6.18 above. To assess the impact of the project on the existing design capacity of these roads, a comparison of the existing volumes and additional daily traffic volumes generated during the project during construction and operation were calculated for the affected travel routes (Yanga Way, the Sturt Highway and Stony Crossing Road).

The predicted traffic volumes for peak and average construction periods are summarised in Table 6.20.



**Table 6.20 Future daily traffic assessment for average and peak construction traffic**

Route	Projected baseline traffic volume (year 2017)	Future total daily traffic (including project)		Design standard – daily vehicles
		Average	Peak	
Yanga Way (north)	596	674	764	500 - 1,000
Yanga Way (south)	596	724	872	
Sturt Highway (east of Yanga Way towards Hay)	1,083	1,122	1,167	1,000 – 3,000
Sturt Highway (west of Yanga Way to Balranald)	1,520	1,559	1,604	
Stony Crossing Road (east of Yanga Way to Swan Hill)	295	376	473	150 – 500
Yanga Way (south of Stony Crossing Road to Tooleybuc)	396	441	494	

The predicted traffic volume impacts during operation are summarised in Table 6.21.

**Table 6.21 Future daily traffic assessment for project operations traffic**

Route	Projected baseline traffic volume (year 2017)	Peak traffic from the project	Future total traffic	Percent traffic increase	Traffic volume design standard
Yanga Way north of the site	596	8	604	1%	500–1,000
Yanga Way south of the site	596	12	608	2%	
Sturt Highway, east of Yanga Way (towards Hay)	1,083	4	1,087	0.4%	1,000–3,000
Sturt Highway, west of Yanga Way (to Balranald)	1,520	4	1,524	0.3%	
Stony Crossing Road, east of Yanga Way (to Swan Hill)	295	8	303	3%	150–500
Yanga Way, south of Stony Crossing Road (to Tooleybuc)	396	4	400	1%	

The predicted increases to traffic volume on each of the affected routes are predicted to be within the relevant Austroads traffic volume thresholds during average and peak construction, and operational stages of the project. The traffic volumes generated by the project are therefore anticipated to have minimal effects on the future traffic operations, level of service and traffic safety.

### iii Site access and parking

Access to the site is proposed via a new intersection from Yanga Way. During consultation with RMS (refer to Section 5.3), it was noted that the proposed new access intersection should be located at least 100 m north or south of the intersection of Yanga Way and Balranald Road. In order to meet RMS safety requirements, the proposed new access intersection location is proposed approximately 150 m south of the existing intersection of Yanga Way and Balranald Road (Figure 6.9). The new intersection location and site access road has been agreed in principle with RMS (refer to Chapter 5) and will be designed in consultation with RMS. The intersection will correspond to Austroads design type BAR/BAL intersection standard on both sides of Yanga Way on the approaches to and departures from the future intersection. The proposed location is shown in Figure 6.9.



The site access road would experience a peak daily traffic volume during construction of up to 444 daily vehicle trips (204 average), and up to 20 daily vehicle trips during operation. Sealing of the initial length of approximately 50 m of the site access road from Yanga Way, with a minimum sealed width of 6.5 m, forms part of the intersection design. This would facilitate the turning of large vehicles to and from Yanga Way at the intersection and minimise the potential tracking of road verge dirt and debris onto public roads by construction vehicles.

Generally during the construction period the largest vehicles anticipated to be visiting the site for construction deliveries on a regular basis will be 19 m long semi trailers. Parking for the construction and operation workforces will be provided on site in gravel surfaced parking areas with dimensions to accommodate the number and size of vehicles (refer to Figure 3.1).

**iv Intersections**

The future volumes of through traffic using the Balranald Road intersection on Yanga Way are not anticipated to increase significantly as a result of the project and will remain at approximately 60 vehicle movements per hour (two-way traffic) for the duration of construction. The existing peak hour traffic movements using the intersection from the Balranald Road direction are estimated at 10 vehicle movements (which corresponds to approximately 100 daily vehicle movements).

The need for dedicated turning lanes at the proposed site access intersection has been assessed by reference to the Austroads intersection design warrant chart and the Austroads intersection road design guide extracts. Forecast project peak hourly traffic volumes in Table 6.19 are summarised for typical future morning and afternoon peak hour traffic periods in Table 6.22.

**Table 6.22 Future forecast turning traffic volumes using the site access at Yanga Way**

Period	Time of day	Hourly traffic entering the site		Hourly traffic leaving the site	
		From the north	From the south	To the north	To the south
Average construction	Morning peak hour	18	27	1	3
	Afternoon peak hour	1	3	18	27
Peak construction	Morning peak hour	40	60	2	4
	Afternoon peak hour	2	4	40	60
Operations	Morning peak hour	2	2	1	1
	Afternoon peak hour	1	1	2	2

The findings of this intersection traffic assessment, using the forecast major road and minor road traffic volumes for each leg of the intersection show, with reference to the Austroads warrant chart (refer to Appendix H), that a Type BAR/BAL intersection left or right turn safety treatment is required at both the Yanga Way major road approaches to the intersection.

**v Glare and distraction**

The potential impacts of reflectivity on motorists travelling along Yanga Way, are glint and glare. Glint refers to shorter period and more intense levels of exposure, while glare refers to sustained or continuous periods of exposure to excessive brightness, but at a reduced level of intensity (Morelli 2014). The amount of glint and glare produced by a PV solar panel is variable and is dependent on the angle of the panels, with lower angles producing less glint and glare (Morelli 2014).



The potential for glint and glare to cause a distraction to drivers travelling either northbound or southbound along Yanga Way, or westbound on Balranald Road approaching Yanga Way, was considered. Vegetative screening is not considered to be necessary, given the offset distances of over 500 m to the nearest solar panel infrastructure from vehicles travelling along Yanga Way, and the significant vegetative buffer screening which is already provided by the travelling stock reserve along the western side of Yanga Way. An assessment of visual impacts from near the intersection of Yanga Way and Balranald Road is provided in Section 6.6 and Appendix F. This includes a photomontage, which illustrates the maximum potential visible extent of project infrastructure from this location.

#### **vi Management and mitigation**

The traffic impact assessment predicts that impacts during construction and operation will not have a significant impact on the road network, including capacity of the major traffic routes and intersections, or road safety.

The proposed intersection treatments for the site access road intersection with Yanga Way would be incorporated into an EMP, adopting relevant Austroads and RMS guidelines. Details of the relevant standard designs (Austroads 2010) for the intersection construction are included in Appendix H. The EMP will also include temporary traffic control arrangements during the peak stages of construction traffic activity and on days when deliveries by oversize vehicles may be required.

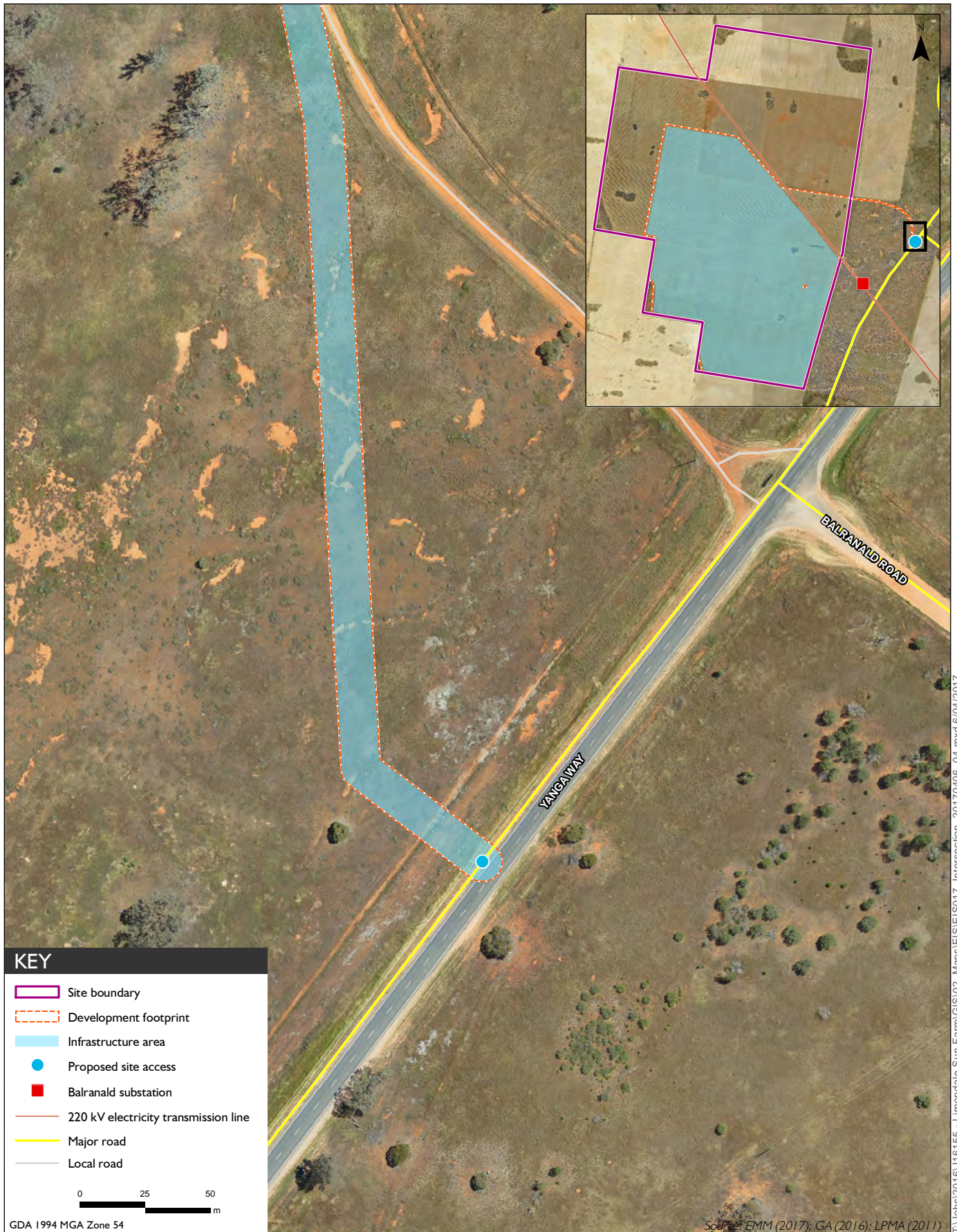
As identified in Section 4.2.4, OVERLAND will be required to lodge a Section 138 Certificate (Work on Public Lands) for RMS approval prior to road work for the intersection construction.

#### **vii Conclusion**

The project will not adversely impact on the surrounding road network and complies with all relevant requirements.

Additional traffic generated by the project (including cumulative impacts with the proposed Sunraysia Solar Farm) will not cause the future daily traffic volumes on either the Sturt Highway, Yanga Way or Stony Crossing Road, to exceed the relevant design levels that would necessitate road widening improvements.

As per consultation with RMS, a new intersection is proposed for site access, approximately 150 m south of the intersection between Yanga Way and Balranald Road (Figure 6.9). The new intersection design will be developed in consultation with RMS. Type BAR/BAL right and left turn sealed shoulder widening is required for both the northbound and the southbound traffic approaches on Yanga Way. Internal site roads and car parking will be constructed to serve the project's access and car parking needs during construction and operation.



**Proposed intersection location**  
 Limondale Sun Farm  
 Environmental impact statement  
 Figure 6.9



## **6.9 Water**

### **6.9.1 Introduction**

The SEARs require an assessment of the potential impacts of the Limondale Sun Farm project on water. The SEARs state that this EIS must include:

an assessment of the likely impacts of the development on surface water and groundwater resources (including watercourses, wetlands, riparian land, groundwater dependent ecosystems and acid sulphate soils), related infrastructure, adjacent licensed water users, basic landholder rights, and measures proposed to monitor, reduce and mitigate these impacts; details of water supply arrangements; address any flooding impacts of changes to water courses; and a description of the erosion and sediment control measures that would be implemented to mitigate any impacts in accordance with *Managing Urban Stormwater: Soils & Construction* (Landcom 2004).

A desktop assessment of the site was undertaken and relevant publicly available information about the site was reviewed and assessed. Consultation with the landholder, affected landholders surrounding the site boundary and members of the local community has also been undertaken (refer to Section 5.4).

### **6.9.2 Existing environment**

#### **i Flooding**

Balranald has a long history of flooding, being on the Murrumbidgee River. The 1956 flood has been the largest recorded flood event, with an approximate average recurrence interval (ARI) of 90 years (SKM 2003). Balranald has had three minor floods since the flood level gauge at Balranald Weir began operation in 1979; these occurred in 1989, 1990 and 2012. There were no moderate or major floods in this period (Murray-Darling Basin Authority [MDBA] 2012). The Balranald LEP identifies flood planning areas and land subject to inundation within the Balranald Shire LGA. The flood extent is based on a 100 year ARI flood event plus 0.5 m freeboard, based on the 1956 flood event identified above. The site is outside of the 'land subject to inundation extent' defined within the Balranald LEP.

The site is outside of the inundation extent for the Lower Murrumbidgee Floodplain, which has been defined by the MDBA (2012) and, subsequently, sits outside the boundary of the Lower Murrumbidgee Floodplain Water Management Plan (Hardwick and Maquire 2012).

#### **ii Surface water resources**

The site is part of the Murrumbidgee catchment and is approximately 6.5 km from the Murrumbidgee River at its closest point (see Figure 2.1). The Murrumbidgee catchment covers an area of 84,000 km<sup>2</sup> and is bordered by the Great Dividing Range to the east, the Lachlan catchment to the north and the Murray catchment to the south (Office of Water 2011). The catchment supports a population of more than 500,000 people, which includes the Australian Capital Territory and a number of regional cities and towns including Balranald. Within the catchment, the Murrumbidgee River stretches over 1,600 km, flowing westward toward its junction with the Murray River. Close to the site, the river is characterised by a diminishing channel capacity due to the deposition of alluvium (Office of Water 2011). Notably, the channel capacity drops from 30,000 megalitres (ML)/day at Hay to 7,000 ML/day at Balranald (Office of Water 2011).



The Murrumbidgee catchment supports Fivebough and Tuckerbil Swamps, which are both listed as internationally significant under the Ramsar Convention. The Fivebough and Tuckerbil Swamps Ramsar site is approximately 270 km upstream of the site. In addition, the catchment also supports 16 wetlands listed as nationally significant in the Directory of Important Wetlands in Australia (DoEE 2016b). Of these wetlands, the Lowbidgee Floodplain is closest to the site, approximately 4.5 km north-east of the site. The Lowbidgee Floodplain is the largest area of floodplain wetland remaining in the Murrumbidgee Valley, covering an area of over 2,000 km<sup>2</sup> (Office of Water 2011).

Yanga Lake, which is part of the Yanga National Park and the Lowbidgee Floodplain, is the most significant surface water feature near the site, approximately 4.5 km to the north-east.

### **iii Groundwater resources**

The site is within the Lower Murrumbidgee Alluvium groundwater management area which is characterised by an inland alluvial aquifer. Groundwater within the inland alluvial aquifer is of poor quality and is affected by salinity (7,000-35,000 TDS mg/L) (Office of Water 2011). It is suitable for limited stock use and commercial and industrial uses (Office of Water 2011). There is a private groundwater bore recorded on the DPI Water database approximately 4.5 km east of the eastern site boundary (GW404517). This bore is authorised for stock watering and domestic purposes and will not be affected by the project. In addition, a NSW Office of Water monitoring bore, installed in 1999, is positioned 1.5 km east of the eastern site boundary (GW501168). In 2011, the standing water level at this location was recorded as 10.55 m.

The *Atlas of Groundwater Dependent Ecosystems* (BoM 2017) does not identify any groundwater dependent ecosystems (GDEs) in the site boundary.

### **iv Acid sulphate soils**

There are no known occurrences of acid sulphate soils within the site boundary. The risk of acid sulphate soils is considered low due to the absence of water bodies and aquatic ecosystems.

## **6.9.3 Impact assessment**

### **i Flooding**

Flooding was a consideration in the site selection and project design process described in Section 3.2. As described in Section 6.9.2, available flood inundation mapping indicates the site is not subject to inundation from a 100 year ARI event.

The infrastructure to be established within the development footprint is unlikely to have a significant impact on local or regional flooding, as it will not require significant earthworks or changes to the general topography of the site. Therefore, existing flow paths are expected to be maintained.

### **ii Surface water resources**

At its closest point, the site is approximately 6.5 km south-east of the Murrumbidgee River and approximately 12 km north-east of the Wakool River, respectively. At these distances, the project will have negligible impacts on these surface water resources.



### iii **Groundwater resources**

The project is not likely to impact groundwater during construction, operation and decommissioning due to the estimated depth to groundwater within the site boundary and the limited amount of subsurface disturbance activities required during the installation and decommissioning of project infrastructure. The project will not require access to groundwater resources within the vicinity of the site (ie GW404517 and GW501168).

### iv **Water licensing**

Basic landholder rights enable landholders to extract water from an aquifer underlying their properties for domestic and stock purposes without the need for a licence under the WM Act. Should water be required for stock watering purposes, the relevant water supply work approvals would be sought under the WM Act.

The WM Act also contains provisions relating to harvestable rights. Harvestable rights allow landholders to collect a proportion of the runoff on their property and store it in one or more farm dams up to a certain size. Any runoff harvested from the site would be within the volume permitted under harvestable rights.

The project will not impact licensed water users.

### v **Water supply arrangements**

The water needs of the project will be met via water trucked to the site. The project has access to general security unit shares from the Murrumbidgee Regulated River Water Source, held by the landowner of the site. In principle agreement has been provided by the landholder to meet the water supply requirements of the project. Notwithstanding, the Murrumbidgee Regulated River Water Source has a well established water trading market, with in the order of 55,000 shares being traded in the period 1 July 2016 to 28 March 2017. For the 2016/17 water year, a total volume of 1,891,963.8 ML of water under general security access licences has been made available, of which the total year to date usage is 473,581.1 ML (as at 10 April 2017) (NSW Water Register, accessed 10 April 2017). Based on the availability of water within this water source, and the active trading market, it is anticipated that the balance of the required volume would be able to be purchased readily from the water trading market.

## 6.9.4 **Management and mitigation**

### i **Flooding**

Project infrastructure will be positioned to minimise the potential obstruction of the surface water flows and stormwater runoff to minimise the possibility of surface water flooding within the development footprint.

### ii **Erosion and sediment control**

An erosion and sediment control plan in accordance with *Managing Urban Stormwater: Soils & Construction* (Landcom 2004) will be prepared in consultation with BSC and will be implemented and monitored during the life of the project to minimise impacts. This plan will include provisions to:

- install erosion and sediment controls (if required) prior to and during construction;
- regularly inspect erosion and sediment controls, particularly following large rainfall/wind events;
- ensure that all vehicles, plant and equipment leaves the site in a clean condition to avoid tracking of sediment on Yanga Way;



- during excavation, separate topsoils and subsoils to ensure that they are replaced in their natural configuration;
- stockpile topsoil appropriately to minimise weed infestation and maintain soil organic matter, soil structure and microbial activity; and
- minimise the total area of disturbance from excavation and compaction.

### 6.9.5 Conclusion

The project is unlikely to have a significant impact on local or regional flooding, surface water and groundwater resources.

Water supply arrangements for the project will be the subject of further consultation with the landholder, surrounding landholders, BSC and relevant agencies.

An erosion and sediment control plan will be prepared in consultation with BSC and will be implemented during the life of the project to minimise impacts.

### 6.10 Hazards

#### 6.10.1 Electromagnetic interference

##### i Background

Electric and magnetic fields (EMFs) exist wherever electricity is generated, transmitted, distributed or used and are strongest closest to their source (ARPANSA 2015). Electric fields are produced by voltage, while magnetic fields are produced by current (ARPANSA 2016). In Australia, EMFs associated with the use of electricity are generated at a frequency of 50 hertz (Hz) (ARPANSA 2016). This frequency falls within the extremely low frequency (ELF) range of 0–3,000 Hz, as defined by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) (2015). Subsequently, power lines, substations, transformers and other electrical sources all emit ELF EMFs (ARPANSA 2015).

The units commonly used to express the strength of a magnetic field include the Tesla (T) or microtesla ( $\mu$ T) and the Gauss (G) or milligauss (mG), where 1 mG is equal to 0.1  $\mu$ T. The typical values of magnetic fields measured near significant electrical infrastructure in Australia, including distribution lines, substations and transmission lines are provided in Table 6.23. It should be noted that distribution lines operate at significantly lower voltage than transmission lines (ARPANSA 2016).

**Table 6.23** Typical values of magnetic fields measured near powerlines and substations

Source	Location of measurement	Range of measurements (mG)*
Distribution line	Directly underneath	2–30
Distribution line	10 m away	0.5–10
Substation	At substation fence	1–8
Transmission line	Directly underneath	10–200
Transmission line	At edge of easement	2–50

Notes: \* Levels of magnetic fields may vary from the range of measurements shown.

Source: ARPANSA (2016).



Extensive research has been conducted to determine whether exposure to ELF EMFs produces adverse health consequences (WHO 2007). As noted by the World Health Organisation (WHO 2007), the health effects related to short-term, high-level exposure to EMFs have been established and form the basis of two international exposure limit guidelines, namely, the International Commission on Non-Ionizing Radiation Protection (ICNIRP) (1998), *Guidelines for limiting exposure to time varying electric, magnetic and electromagnetic fields (up to 300 GHz)*, and the Institute of Electrical and Electronics Engineers (IEEE) Standards Coordinating Committee (2002), *Standard for safety levels with respect to human exposure to electromagnetic fields, 0–3kHz*.

As noted by ARPANSA (2015), the majority of research indicates that ELF EMFs exposure levels normally encountered in the environment, including in the vicinity of power lines, does not pose a risk to human health. Further, there is no established evidence that exposure to magnetic fields from power lines, substations, transformers or other electrical sources causes any health effects (ARPANSA 2015). Nonetheless, the ICNIRP guidelines (1998) define reference levels for occupational and general public exposure to prevent potential adverse health effects from exposure to EMFs. These reference levels are shown in Table 6.24. The ranges of measurements listed within Table 6.24 are well below the exposure limits of 2,000 mG or 200  $\mu$ T defined by international guidelines (ARPANSA 2016).

**Table 6.24 ICNIRP reference levels for occupational and general public exposure**

Exposure characteristics	Electric field strength	Magnetic flux density
	(kilo volts per metre - kV/m)	( $\mu$ T)
Occupational	10	1,000
General public	5	200

Source: ICNIRP (1998).

A study by Chang and Jennings (1994) investigated the level of EMFs generated at two utility-scale PV solar developments in the United States. Specifically, the study compared the magnetic fields generated by these developments with published data on more prevalent magnetic field sources. The study concluded that magnetic fields, considered by Chang and Jennings (1994) to be of greatest public concern, generated by PV solar panel arrays were significantly less than for common household applications. For example, magnetic field measurements taken from the back of a PV solar panel were recorded as significantly less than those recorded from within close proximity of a hair dryer, microwave and television, respectively. Therefore, Chang and Jennings (1994) concluded that EMFs generated by PV solar panel arrays should not generate concern.

Other infrastructure installed as part of the PV solar developments assessed by Chang and Jennings (1994), such as transformers, exhibited more significant magnetic fields. However, these sources were found to be localised and could not be detected at the perimeters of each of the developments assessed (Chang and Jennings 1994). Further, it was noted that concerns about EMFs generated by transformers would also apply to a number of other electricity generation and storage technologies (Chang and Jennings 1994).

## ii Impact assessment

As noted in Chapter 2, the Transgrid 220 kV transmission line traverses the site (Figure 2.1). Based on the typical values of magnetic fields provided by ARPANSA (2016), the level of exposure from the existing transmission line will be significantly below the exposure limit of 2,000 mG or 200  $\mu$ T, which is defined by international guidelines. Further, the nature of exposure to EMFs generated by the existing transmission line will be intermittent for staff involved in the construction, operation and decommissioning stages of the project.



In addition to Transgrid's 220 kV transmission line, staff involved in the construction and decommissioning stages of the project will also be exposed to EMFs during works on the connection infrastructure. Staff exposure levels will be below the recommendations for general public and occupational exposure through the construction and decommissioning of the connection infrastructure.

As noted in Chapter 3, construction of the project includes the installation of electrical infrastructure within the site boundary including cabling, inverters, switchgear and the onsite substation, as well as, connection infrastructure to connect the project to the Balranald Substation and the installation of a large number of PV solar panels. As this infrastructure will be involved in the generation, transmission and distribution of electricity, EMFs will be produced by the project. The EMFs produced by the project will be strongest closest to their respective sources.

Once operational, the project infrastructure will be capable of generating EMFs. The degree of exposure to EMFs within the site boundary will vary depending on proximity to different components of the project infrastructure. Staff exposure during the operational stage of the project will be intermittent and limited to exposure encountered during ongoing maintenance of the site and project infrastructure. The combination of low exposure rates and the intermittent exposure of staff to elements of the project infrastructure capable of generating EMFs indicate that adverse impacts from EMFs are unlikely as a result of the project.

As noted in Chapter 3, public access to the site will be restricted throughout the life of the project. Surrounding landholders accessing the site or persons accessing the adjacent TSR will not be exposed to EMFs generated by the project infrastructure for extended periods of time.

The closest sensitive receptor, R1, is located approximately 2.9 km north of the development footprint and will not be exposed to a higher level of EMFs due to the construction and operation of the project.

The project substation will be located within the development footprint, close to the site's eastern boundary (refer to Figure 3.1). At this location, the project substation will be offset from Yanga Way by approximately 1 km and will be approximately 4 km from the closest sensitive receptor.

As noted in Section 3.4.5, the transmission line to connect the project to the Balranald Substation will be buried underground, and will be wholly within the existing easement of Transgrid's 220 kV transmission line. This will reduce the potential for exposure to ELF EMF.

### **iii Management and mitigation**

As noted in Chapter 3, all project infrastructure will be designed in accordance with relevant industry standards. All relevant procedures in relation to a high voltage installation will be adhered to throughout the life of the project. Further, public access to the site will be restricted throughout the life of the project.

#### **6.10.2 Bushfire**

Bushfire risks associated with the project have been assessed in accordance with *Planning for Bushfire Protection* (PBP) (RFS 2006). Appendix 4.1 of PBP sets out submission requirements for DAs on bushfire prone land. Section 2.5 of PBP requires proponents of major projects, for example SSDs, to consult PBP when undertaking environmental assessments.

Section 63(2) of the RF Act requires the owners of land to prevent the ignition and spread of bushfires on their land. The recommended measures in this section, and any measures in a subsequent bushfire management plan for the project, will ensure that the risk of bushfire ignition and spread will be as low as practically possible.



## **i Existing environment**

This section determines if the project will be on bushfire prone land and describes vegetation and land slopes within 100 m of the infrastructure area, as required by Appendix 4 of the PBP.

### **a. Bushfire prone land**

Bushfire prone land mapping was provided by BSC. As shown on Figure 6.10, areas to the north, east and south of the site have not been mapped as being bushfire prone. Notwithstanding, it is assumed that they qualify as 'vegetation category 2' bushfire prone land under *Guide for bush fire prone land mapping* (RFS 2014) due to the following:

- comprises semi-arid woodland/shrubland (see below); and
- comprise a combined area of vegetation greater than 2.5 ha.

### **b. Native vegetation**

Dr David Keith compiled broad scale native vegetation classifications and maps between 2001 and 2004 for NSW (the Keith formations) (Keith 2004). PBP uses the Keith formations to classify vegetation according to this bushfire hazard (the PBP classifications). The Keith formation and PBP classification of native vegetation within 100 m of the infrastructure area are (Figure 6.11):

- semi-arid woodland (grassy sub-formation), semi-arid woodland; and
- semi-arid woodland (shrubby sub-formation), semi-arid woodland.

### **c. Slope**

Slopes are classified according to PBP, and are combined with vegetation in an area to determine appropriate asset protection zones (APZs) (discussed below). The slope under bushfire hazard vegetation over a distance of 100 m from the infrastructure area was determined using a digital terrain model (1 m height resolution). The slopes were classified according to PBP as follows:

- i) all up-slope vegetation (considered 0°);
- ii) >0 to 5° down-slope vegetation;
- iii) >5 to 10° down-slope vegetation;
- iv) >10 to 15° down-slope vegetation; and
- v) >15 to 18° down-slope vegetation.

Slopes under bushfire hazard vegetation within 100 m of the infrastructure area are class i.



## **ii Bushfire prevention and protection**

### **a. Asset protection zones**

This section identifies the locations and dimensions of APZs needed to achieve necessary bushfire protection. Appropriate widths, maintenance requirements and specifications for service and access provision as provided in Chapter 4 of PBP are addressed.

An APZ is the distance that buildings are set back from vegetation that represents a bushfire hazard (see Appendix 2 of the PBP).

APZs are divided into an 'inner protection area' (IPA) located next to the development in question and an 'outer protection area' where there is adjacent forest vegetation. Only an IPA is required where there is adjacent woodland vegetation.

APZs are determined by referring to Table A2.5 in PBP, which compares fire hazard vegetation formations, slope classes near subject boundaries and fire weather at a site. The fire weather or 'fire danger index' (FDI) for Balranald is 80 (Table A2.3 in PBP). The resulting APZs for the project are 10 m and are shown on Figure 6.11.

The APZs will be IPAs as surrounding vegetation is woodland. The APZs will be maintained as follows:

- canopy cover will be kept at less than 15% of total surface area and at least 2 m from the roof line of a building;
- around buildings, garden beds and shrubs will not be located under trees and sited at least 10 m from any exposed windows or doors;
- lower limbs of trees up to 2 m above the ground will be removed; and
- understorey vegetation will be mowed annually before the fire season (usually September) to reduce fuel loads provided by shrubs and long grasses.

### **b. Services**

Water, gas and electricity services will be located and installed in a manner that reduces the potential for them to contribute to fire hazard. Detailed design has not yet taken place for the project. However, the specifications given below will be incorporated into the detailed project design.

The availability of water is a critical element in the control of a bushfire. Water for the project will be supplied by truck and stored in an on-site water tank, which will be available for fire fighting if required.

There will be fire hydrants at buildings which will be spaced, sized and pressured in accordance with *Australian Standard 2419.1-2005 Fire hydrant installations – System design, installation and commissioning*. The RFS will require a test report of the water pressures if the standard cannot be met. If this is the case, engineering principles will be used to determine the locations, sizing and number of hydrants.



Electricity and gas services will be located so they do not contribute to the risk of fire to a building. The following guidelines will be followed during detailed project design (from Chapter 4 of PBP):

- overhead electrical transmission lines will be installed and managed in accordance with Ausgrid 2010 *NS179 Vegetation Safety Clearances*;
- *AS/NZS 1596:2008 The storage and handling of LP gas* will be followed for bottled gas installation and maintenance (if required), including the use of metal piping;
- there will be minimum 10 m distance between fixed gas cylinders (if required) and flammable materials and shielding will be placed on the hazard side of the cylinders; and
- release valves on gas cylinders close to buildings will be directed away from the building and be a minimum of 2 m from combustible material. Metal connections will be used.

### **c. Access**

The site will be accessed via an existing access road from Yanga Way which can accommodate passing vehicles and support vehicles that weigh over 15 t. A minimum vertical clearance of 4 m will be provided to any overhead obstructions including branches.

### **d. Operations**

A fire ignited within the development footprint could initiate a fire in the surrounding area. The risk of this occurring will be reduced by adoption of the following measures:

- refuelling will be undertaken in designated refuelling bays (there will not be any vegetation in these areas), especially when the fire danger rating is very high or above;
- fire extinguishers will be maintained in buildings, vehicles and refuelling areas;
- there will be no smoking within the development footprint; and
- spill response kits will be available should there be a spill of flammable substances.

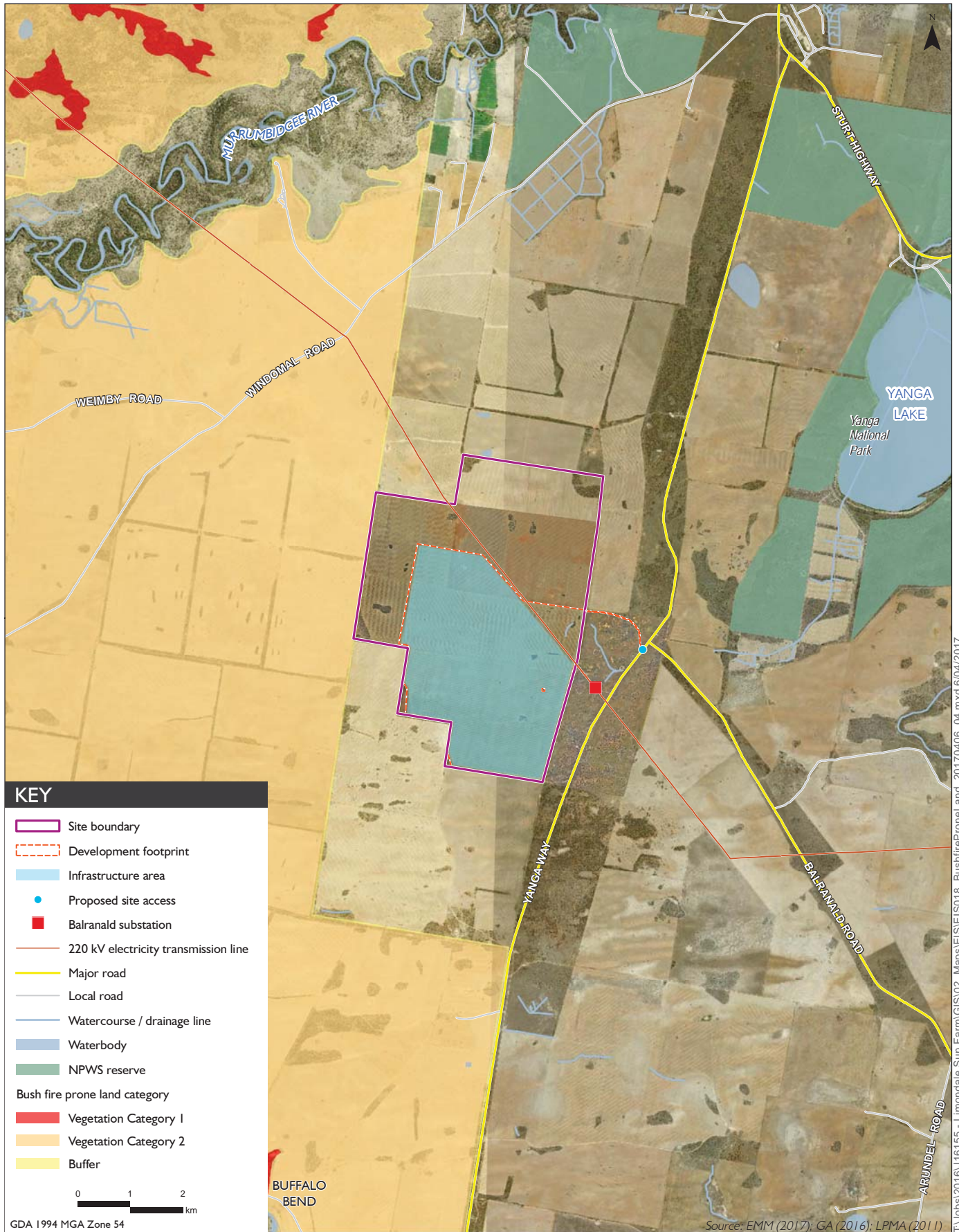
In addition, the severity of fires will be reduced by implementing the following:

- a bushfire management plan will be prepared and implemented;
- a UHF/VHF communication system will be established, enabling rapid response to emergencies;
- risk reduction, such as slashing, will be undertaken where appropriate, such as along fencelines; and
- the RFS will be contacted if there is a fire.

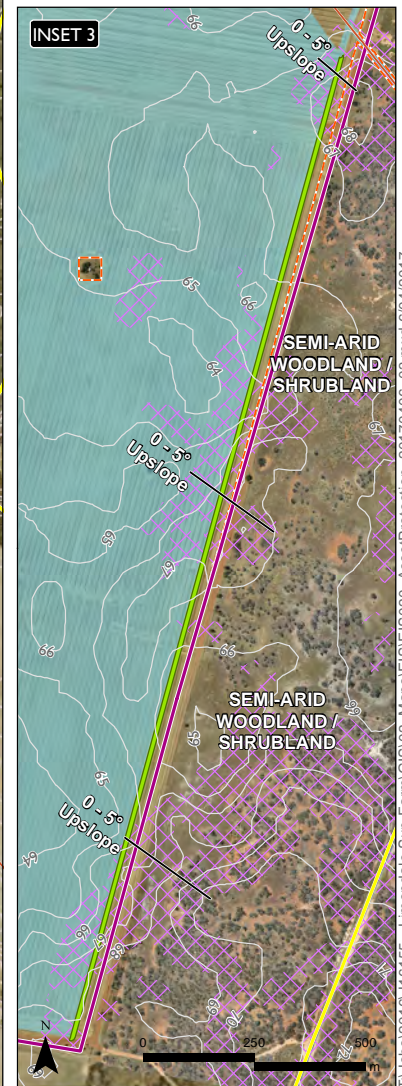
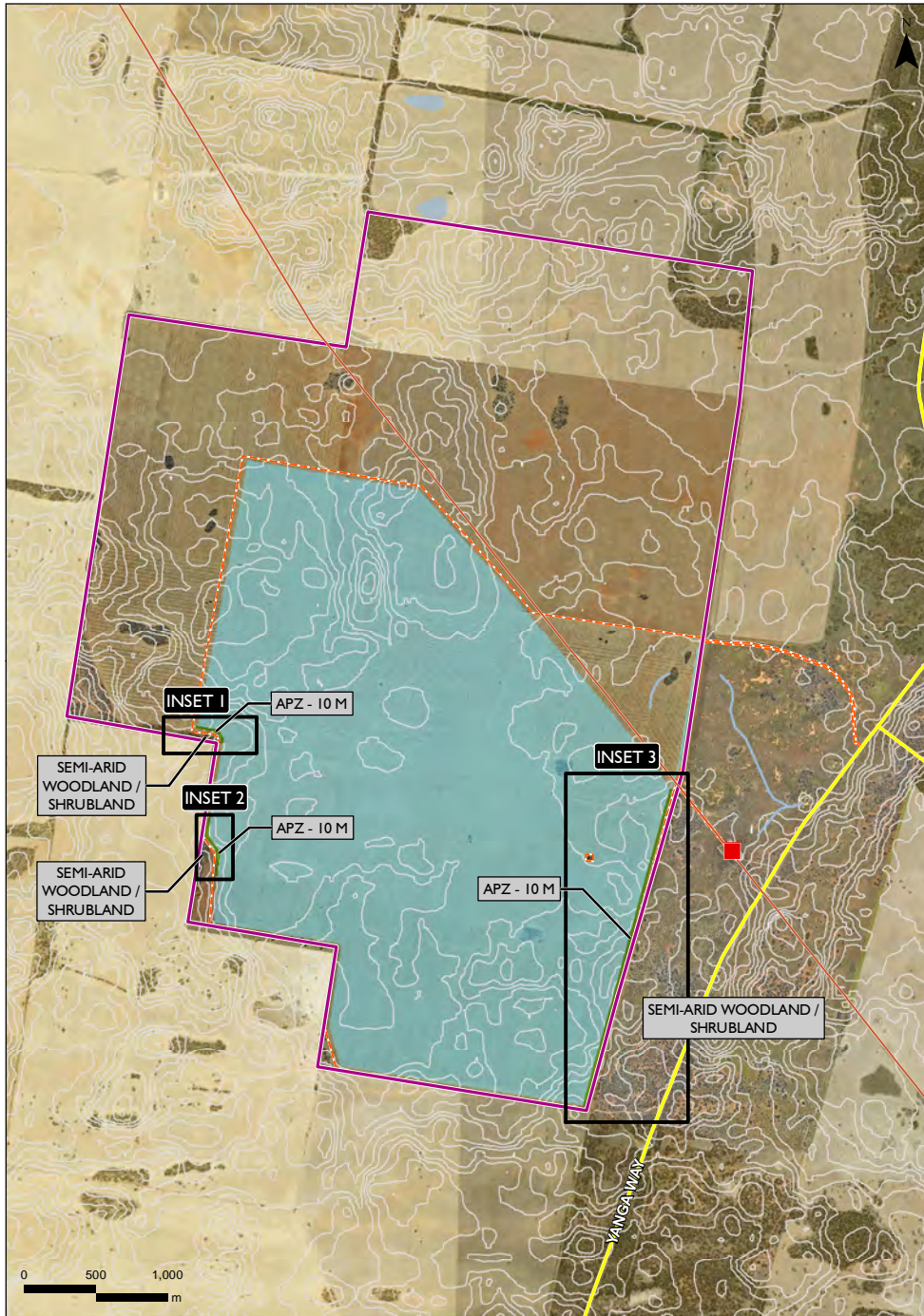
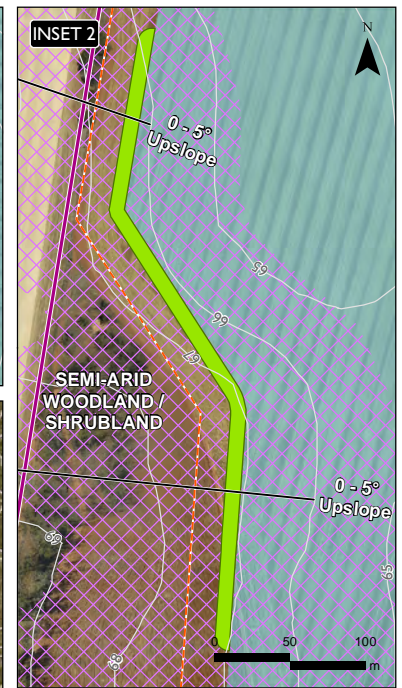
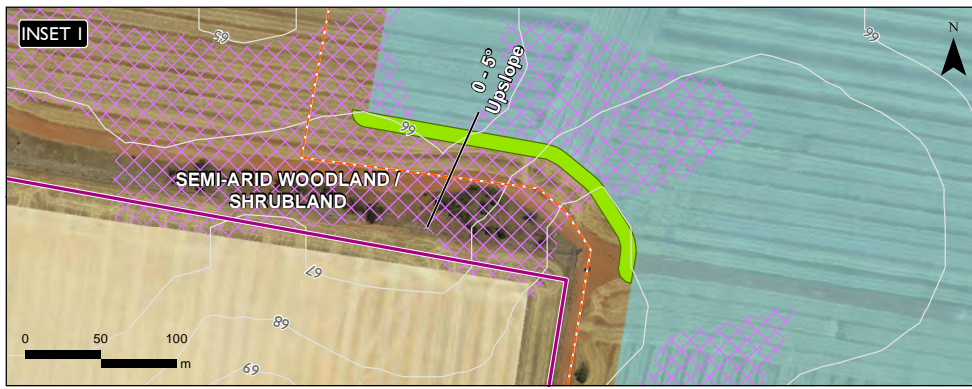
The project will be in the Lower Western RFS district, with four RFS brigades in the Balranald LGA.

### **e. Bushfire construction levels**

Section A4.1 of PBP requires an assessment of whether specific buildings are capable of complying with the bushfire construction levels described in *Australian Standard 3959 – 2009 Construction of buildings in bushfire prone areas* (AS 3959 – 2009). The specific buildings are classified by the *Building Code of Australia* (BCA) as class 1, 2, 3 and 4 buildings; and some class 9 and 10 buildings (Australian Building Codes Board 2013).



**Bushfire prone land**  
 Limondale Sun Farm  
 Environmental impact statement  
 Figure 6.10



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Source: EMM (2017); GA (2016); LPMA (2011)

KEY			
	Site boundary		Balranald substation
	Development footprint		220 kV electricity transmission line
	Infrastructure area		Major road
			Watercourse / drainage line
			Waterbody
			Contour (1 m)
			Asset protection zone (10m)
			0 - 5° slope

GDA 1994 MGA Zone 54

**Asset protection zones**  
 Limondale Sun Farm  
 Environmental impact statement  
 Figure 6.11





Project related structures do not correlate to the above BCA classes and, therefore, do not have bushfire construction levels specified in AS 3959 – 2009. Notwithstanding, PBP requires that such buildings comply with the general bushfire construction requirements in section 3 of AS 3959 – 2009. The structures will be constructed to comply with these requirements.

### **iii Conclusion**

This section describes measures to enable the project to comply with the objectives of PBP. Specifically, APZs will be provided and managed to enable fire fighting vehicle access and to distance vulnerable structures from vegetation which represents a fire hazard. The risk of the project initiating a bushfire will be minimised through the implementation of appropriate management measures.

## **6.11 Air quality**

### **6.11.1 Existing environment**

The site is in a rural setting, with the nearest concentration of sensitive receptors in Balranald township, 14 km to the north. The area surrounding the site is sparsely populated.

The Balranald Shire LGA is heavily dependent on agricultural activities, which are likely to have a significant influence on local and regional air quality. Consequently, existing sources of air pollution within the area are limited and are primarily comprised of dust and vehicle and machinery exhaust emissions associated with transportation and agricultural activities. Bushfires are also a source of seasonal dust generation (OEH 2016b).

There are no facilities within the Balranald Shire LGA that are required to report their emissions as part of the National Pollutant Inventory (NPI) (DoEE 2017). The closest facility to the site boundary that is listed within the NPI is a wine and other alcoholic beverage manufacturing facility approximately 34 km south-west of the site.

Six rural dwellings have been identified within an approximate 6 km radius of the site, identified as sensitive receptors R1-R6 (Figure 2.1). Sensitive receptor R5 is on the site of the proposed Sunraysia Solar Farm (see Section 3.9).

### **6.11.2 Impact assessment**

#### **i Construction**

Emissions to the atmosphere from the project during construction will be temporary in nature and will be restricted to dust caused by soil and surface disturbances and vehicle, plant and equipment exhaust emissions. Construction of the project will take approximately 12–15 months from the commencement of site establishment works.

Due to the development footprint's relatively flat terrain and predominantly cleared landscape, limited site preparation and civil works will be required. During site establishment and construction, surface disturbance works will be limited to:

- construction of access tracks and boundary fencing;
- installation of piles to provide support for the mounting framework required for the PV solar panels;
- preparation of foundations for the inverter blocks;
- installation of underground cabling between the PV solar panels and the collection circuit;



- construction of transmission infrastructure between the project switchyard and the Balranald Substation; and
- erection of permanent fencing and security.

No extensive earthworks are proposed.

Exhaust emissions will also be generated by the plant and equipment required for the construction of the project, which includes:

- vehicles travelling to and from the site;
- earthmoving machinery and equipment for site preparation;
- cable trenching and laying equipment;
- post-driving equipment;
- assisted material handling equipment (forklifts and cranes);
- machinery and equipment for connection infrastructure establishment; and
- water trucks for dust suppression.

During decommissioning, no additional air quality impacts to those described above are anticipated. Total vehicle movements to and from the site during decommissioning will be similar to those experienced during construction. However, it is anticipated that the length of the decommissioning stage will be shorter than the construction stage and therefore emissions to the atmosphere will also be experienced over a shorter period of time.

## **ii Operation**

Ongoing maintenance of the site and project infrastructure will be required during operation. The infrastructure maintenance activities listed in Section 3.6 will result in minor, localised vehicle emissions, and generation of dust from vehicles travelling along the internal, unsealed access roads (Figure 3.1). Provided the recommended mitigation measures are implemented, predicted impacts would be adequately managed.

### **6.11.3 Management and mitigation**

The project will not generate significant air quality impacts during construction, operation or decommissioning provided the following mitigation measures are implemented:

- use of a water truck(s) during construction for dust suppression along internal, unsealed access roads and disturbed areas;
- vehicle movements will be minimised where possible;
- all vehicles, plant and equipment will be cleaned and washed regularly;
- all vehicles, plant and equipment will be switched off when not in continuous use;
- all vehicles, plant and equipment will be regularly inspected and maintained to ensure that they are operating efficiently;
- regular maintenance of unsealed access roads will be undertaken to minimise wheel generated dust;



- a 50 m section from the site access road to the intersection of Yanga Way will be sealed to prevent the transport of soil and dust to the surrounding road network; and
- dust suppression requirements during construction will take into consideration weather and the likelihood of extended dry periods which could exacerbate impacts.

#### **6.11.4 Conclusion**

The implementation of the recommended mitigation measures will ensure that the project will not generate significant air quality impacts during construction, operation or decommissioning.

### **6.12 Socio-economic**

#### **6.12.1 Existing environment**

Balranald is the largest township in the Balranald Shire LGA with a population of 1,159. The population of the Balranald Shire LGA in 2011 was 2,283 compared to 2,441 in 2006, which reflects a decline of 158 people (or 6.47%) residing in the area (ABS 2007; ABS 2013). Similarly, the township of Balranald also experienced a decline in population over this period. Recently, significant developments implemented as part of the Balranald Shire Economic Development Strategy, have fostered economic growth and diversification within the township. These significant developments, which include the construction of the Visitor and Interpretive Centre, Balranald Hospital and Balranald Central Trade School, have each provided additional employment opportunities for the township's population and resulted in varied improvements to the level of services available for locals and visitors (BSC 2016).

Agriculture is the dominant industry of employment for Balranald's population, with school education and local government administration among the township's other major employers reflecting the township's role as a service centre within the Balranald Shire LGA (ABS 2013). Though traditionally reliant on dry-land and irrigated agricultural production, the economy within the greater Balranald Shire LGA has experienced significant diversification to encompass horticulture, viticulture and organic agricultural production. The most common occupations in Balranald township include labourers, machinery operators and drivers, managers (including farmers), community and personal service workers, and technicians and trades workers (ABS 2013). In September 2016, the unemployment rate within the Balranald Shire LGA was 3.9%, which was less than the NSW and Australian unemployment rates, which were 5.2% and 5.7%, respectively (DoE 2016).

Tourism has become an important economic contributor in Balranald with domestic and international tourists attracted to the Yanga and Mungo National Parks within the Balranald Shire LGA (BSC 2016). The township of Balranald is also the location of a number of the region's major festivals and annual events including the 5 Rivers Outback Festival, the Murrumbidgee Fishing Classic and the Balranald Racing Club's Balranald Cup and Derby Day.

Within the township of Balranald, there are a number of short-term accommodation options available for tourists and visitors, including motels, motor inns, and onsite cabins (within the Balranald Caravan Park). A review of available accommodation conducted in January 2017 indicated that there are at least 80 rooms available within the township of Balranald. Additional short-term accommodation options are also available in surrounding towns and regional centres, including: Euston (approximately 80 km west of Balranald); Tooleybuc (approximately 55 km south-west of Balranald); Swan Hill (approximately 90 km south of Balranald); and Hay (approximately 130 km east of Balranald).



### **6.12.2 Impact assessment**

Based on the results of stakeholder engagement (refer to Section 5.4), there is a positive attitude and broad community support for the Limondale Sun Farm.

The project will make important contributions to the production of renewable energy in NSW while creating employment opportunities, diversifying local revenue streams and generating direct and indirect benefits to the local economy during the life of the project.

#### **i Direct and indirect economic benefits**

The project will diversify and strengthen the region's economic base and benefit local businesses through direct expenditure and employment, as well as indirect benefits such as employee expenditure locally and use of local services.

The project will provide economic benefits to the township of Balranald and the Balranald Shire LGA, as well as surrounding LGAs. The project will also provide additional economic stimulus, employment opportunities and investment in community infrastructure and services, which may act to counter population decline. The project will also provide increased demand for community and retail services within the township of Balranald.

One of the economic development opportunities identified within the Balranald Shire Economic Development Strategy is renewable energy. As noted within the strategy, there are opportunities to attract investment in renewable energy generation within the Balranald Shire LGA, which will have positive flow-on effects, driving economic growth, employment, prosperity and diversity (BSC 2012a). The project will facilitate these positive flow-on effects. In addition, the project also aligns with the vision and strategic objectives defined within the Balranald Community Development Plan (BSC 2012b). For example, through provision of additional employment opportunities, the project will help build the strength and resilience of the Balranald Shire LGA's economy and address one of the key community challenges and issues identified for the township of Balranald, ie lack of employment diversity. In addition, the project will also lead to improvements to the Balranald Shire LGA's energy infrastructure.

#### **ii Workforce**

As noted in Section 3.5.6, during construction an average of 90 FTEs will be required for a 1215 month period, which will create demand for short and medium term accommodation options. The workforce will be sourced from both the local and wider region, and is expected to comprise a combination of people residing locally, and those who would travel from other regional or metropolitan areas and reside temporarily in short and medium term accommodation (eg motels, rental accommodation) during construction. For the purposes of this EIS, it has been assumed that the workforce is distributed between the four LGAs which border and/or are in close proximity to the project, as shown in Table 6.25. It is anticipated that a proportion of the workforce will be from the resident population within these LGAs. The relative proportions assumed above are related to the resident population of each LGA.



**Table 6.25 Construction workforce location of residence (temporary and resident) during construction**

Local government area	Population (2014, estimated number of persons)	Proportion of workforce (%)	Residing construction workforce (temporary and resident)	
			Average	Peak
Balranald	2,400	20	18	40
Hay	2,989	20	18	40
Murray River	3,990 <sup>1</sup>	20	18	40
Rural City of Swan Hill	20,580	40	36	60
<b>Total</b>			<b>90</b>	<b>200</b>

Notes: 1. Population for Wakool LGA, 2014, prior to Murray River Council merger.  
2. Population estimates based on ABS national regional profile data last updated in 2016.

As described above, some of the workforce is likely to travel from other regional or metropolitan areas and reside in the area temporarily. This will create demand for short and medium term accommodation. As described in Section 6.12.1, there are in excess of 80 rooms in Balranald township. The temporary influx of workers during the project's construction may place pressure on local short-term accommodation and other services within the township of Balranald. If not managed, this could have adverse flow-on effects on local tourism. For example, the project may restrict the availability of supply of short-term accommodation to other users during peak demand periods such as weekends coinciding with any of the region's major festivals and annual events. However, given some of the workforce are expected to comprise some of the resident population, the temporary demand for accommodation in Balranald or other LGAs (see Table 6.25) is not likely to place significant strain on the existing temporary accommodation for the majority of the duration of construction. Further, both an email to OVERLAND and correspondence with local residents during the community information sessions identified capacity within the rental market in Balranald township to absorb any additional short and medium term demand for accommodation that cannot be met by motels, motor inns, and/or onsite cabins.

As noted in Section 3.7, the project will also create employment opportunities during operation and decommissioning. Up to seven FTEs will be required during the operational stage of the project. It is not yet known how many employment opportunities will be available during decommissioning; however it is expected that less staff will be required on site than during construction. The duration of decommissioning will also determine the extent of direct and indirect economic benefits made available for local businesses and industries during the final stage of the project.

Due to the relatively small volume of potential new residents to the Balranald Shire LGA as a result of the project, it is not anticipated that this will impact the availability of housing for existing or other new residents.

### iii Amenity

There may be some noticeable increases in traffic travelling along local roads during the peak of construction. As noted in Section 6.8, the predicted additional daily traffic generated at the peak stage of project construction will be approximately 444 daily vehicle trips, reducing to approximately 204 daily vehicle trips during the earlier and later (average) stages of project construction and a maximum of 20 daily vehicle trips during operation. Further discussion of the potential impacts of the project on traffic is provided in Section 6.8.

The potential impacts of the project on air quality (Section 6.11), noise (Section 6.7), land (Section 6.5) and the visual landscape (Section 6.6) have been discussed in more detail in other sections of the EIS.



### 6.12.3 Management and mitigation

The project is anticipated to have social and economic benefits for the region. The proposed management and mitigation measures focus on maximising the potential benefits of the project and, where possible, resolving potential conflicts before they are encountered.

The proposed management and mitigation measures that would be implemented for the project include:

- a preference for local employment wherever possible;
- a preference for use of local businesses such as motels, motor inns, restaurants and service providers wherever possible;
- consideration of demand on local short-term accommodation demand and potential conflicts with the region's major festivals and annual events; and
- provision of information to the community about the timing of project construction period and need for employees and services from local business and services.

### 6.12.4 Conclusion

Through the provision of additional economic stimulus, employment opportunities and investment in community infrastructure and services, the net community benefit of the project is considered to be positive. The implementation of the proposed management measures will mitigate potential adverse impacts from the project, such as impacts to the availability of local short-term accommodation during defined periods, such as during any of the region's major festivals and annual events.

## 6.13 Cumulative impacts

### 6.13.1 Introduction

The SEARs require an assessment of the potential cumulative impacts of the project with the proposed adjacent Sunraysia Solar Farm (refer to Figure 2.4). This includes consideration of visual amenity, compatibility of land use, capacity of the electricity transmission network, traffic and construction noise impacts.

As noted in Section 2.6, Sunraysia Solar Farm Two Pty Ltd proposes to develop the Sunraysia Solar Farm adjacent to the site's southern boundary (Figure 2.4). The Sunraysia Solar Farm is proposed to have a capacity of around 200 MW and cover an area of approximately 1,000 ha. The assessment of cumulative impacts has been based on the information contained within the EIS for the Sunraysia Solar Farm (NGH Environmental 2017). OVERLAND has also consulted with Sunraysia Solar Farm Two Pty Ltd, the proponent of the proposed Sunraysia Solar Farm, to discuss a number of matters including the potential cumulative impacts of the two projects.

As noted in Section 2.6, Iluka Resources Limited proposes to develop the Balranald Mineral Sands Mine approximately 12 km north-west of Balranald (Figure 2.4). OVERLAND engaged with Iluka Resources Limited throughout the preparation of the EIS for the project and the outcomes of this consultation informed the site selection and design process for the project (refer to Section 5.3).



As noted in Section 2.6, goFARM proposes to expand its agricultural operations and develop a temporary accommodation camp on Lot 21 DP 751173, adjacent to the site's northern boundary. If approved, the camp would house up to 40 people who would be involved in the development of a large almond and pistachio crop (approximately 7,000 ha). OVERLAND engaged with goFARM during the preparation of the EIS for the project (refer to Section 5.3).

### **6.13.2 Impact assessment**

#### **i Balranald Mineral Sands Mine**

Cumulative impacts from the project, the Balranald Mineral Sands Mine, the Sunraysia Solar Farm and goFARM were considered, however, due to the distance between the Balranald Mineral Sands Mine and the two large-scale solar projects and goFARM (in the order of 26 km) (refer to Figure 2.4), cumulative visual, traffic and noise impacts are considered to be negligible.

Adverse cumulative impacts associated with accommodation in the township of Balranald is unlikely, as the Balranald Mineral Sands Mine includes an accommodation facility at either the mine site or within Balranald township to cater for the construction and operational workforce required for the life of the project, thereby avoiding the potential for cumulative impacts on local short-term accommodation with the Limondale Sun Farm, the Sunraysia Solar Farm and goFARM.

#### **ii Sunraysia Solar Farm**

##### **a. Visual amenity**

The construction of the project and the Sunraysia Solar Farm on adjacent land parcels (Figure 2.4) will expand the overall area within the Balranald Shire LGA that is occupied by solar infrastructure. Collectively, project infrastructure for the two developments will cover an area of over 2,000 ha. Once constructed, the PV solar panel arrays will be the prominent visual feature of both developments throughout their respective operational stages (refer to Photograph 3.1). As noted in Section 6.6, the visual impact of the Limondale Sun Farm is minimal, based on the presence of vegetation and topography, combined with the relatively low height of the project's infrastructure and distance of viewpoints. There is less screening vegetation present between Yanga Way and the Sunraysia Solar Farm, and project infrastructure may be visible by motorists travelling along Yanga Way and some nearby sensitive receptors (refer to Appendix F, Section 6.6 and NGH Environmental 2017). Therefore, the project is not considered to contribute to cumulative visual impacts.

During construction, the landscape within the respective development footprints will undergo a number of physical changes, namely through the installation of project infrastructure, which will add new features to the visual landscape. Views of the two sites during construction will be predominantly from motorists travelling along Yanga Way. As noted in Section 6.8.3, it is assumed the focus of these motorists will be in line with their direction of travel along Yanga Way. Any changes to the visual landscape during construction are not considered significant due to the screening provided by vegetation within the TSR, the low visual sensitivity of passing motorists and temporary nature of construction activities.



Should the Sunraysia Solar Farm be constructed, it will require the construction of an overhead transmission line to connect the proposed solar farm to the Balranald Substation. This connection infrastructure will be approximately 2.3 km in length and will require the installation of up to 10 power poles at a maximum height of 50 m (NGH Environmental 2017). This connection infrastructure will traverse the TSR and will be adjacent to the project's eastern site boundary for a length of approximately 1.3 km. It is anticipated that this infrastructure, as well as additional infrastructure, such as the PV solar panel arrays would be visible from three of the viewpoints considered as part of the project's visual impact assessment (refer to Appendix F). Once constructed, the overhead transmission line will also become a prominent visual feature for motorists travelling along Yanga Way in the vicinity of the two developments.

#### **b. Compatibility of land use**

As noted in Section 6.5.3, the project will temporarily remove approximately 1,072.4 ha of LSC Class 6 and approximately 30.5 ha of LSC Class 4 from potential agricultural production during the life of the project (in the order of 30 years). Similarly, if constructed, the proposed Sunraysia Solar Farm would remove approximately 1,000 ha of LSC Class 6 from potential agricultural production during the life of the project (also in the order of 30 years) (NGH Environmental 2017). As noted in Table 6.8, land identified under this classification is recognised as having very severe limitations and is incapable of sustaining many land use practices (eg cultivation, moderate-to-high intensity grazing and horticulture) (OEH 2013). This land is suitable for low intensity land uses (eg low intensity grazing) (OEH 2013).

Agriculture is the major land use and major employment industry within the Balranald Shire LGA, accounting for approximately 96% of the total land area or approximately 2,075,748 ha and 31% of total employment, which includes employment from more than 170 agricultural businesses (ABS 2013). The two developments will result in the removal of approximately 0.11% of the total land area within the Balranald Shire LGA that is currently used for agricultural production. However, as noted in Section 3.3, the history of agricultural production on the site has been primarily opportunistic cropping due largely to considerable fluctuations in both rainfall and evaporation rates.

The Limondale Sun Farm has been developed to avoid and minimise land disturbance and overall impacts on agricultural land where possible. As noted in Section 3.2, the final site boundary and development footprint for the project have been selected to avoid fragmenting the landholder's residual agricultural land.

During decommissioning of the project and the Sunraysia Solar Farm, project infrastructure will be removed and, if required, land within the respective site boundaries will be rehabilitated to their pre-existing condition. At the completion of decommissioning, both sites will be available for agricultural production. Therefore, neither development will result in the permanent removal of land within the Balranald Shire LGA from agricultural production.

#### **c. Traffic**

As part of the traffic impact assessment (Appendix H), cumulative impacts were considered with the construction of the Sunraysia Solar Farm and Balranald Mineral Sand Mine. This assessment assumes that construction of the three projects occurs concurrently. In reality, this is not likely to eventuate, and is therefore considered to be conservative. Traffic volumes were obtained from publically available EIS documents. The results are summarised in Table 6.26.



**Table 6.26 Future cumulative construction traffic assessment including the Sunraysia Solar Farm**

Traffic generation route	Projected baseline daily traffic volume (year 2017)	Peak daily traffic from both projects			Future total daily traffic	Percent traffic increase
		Limondale Sun Farm	Sunraysia Solar Farm	Balranald Mineral Sands Mine (construction)		
Yanga Way north of the site	596	78	30	136	840	41%
Yanga Way south of the site	596	126	70	136	928	41%
Sturt Highway, east of Yanga Way (towards Hay)	1,083	39	15	18	1155	7%
Sturt Highway, west of Yanga Way (to Balranald)	1,520	39	15	154	1728	14%
Stony Crossing Road, east of Yanga Way (to Swan Hill)	295	81	45	-	376	43%
Yanga Way, south of Stony Crossing Road (to Tooleybuc)	396	45	25	-	466	18%

The results in Table 6.26 demonstrate that the daily traffic volume design standards would still be met for each of the traffic routes.

The results in Table 6.26 show that the highest proportional daily traffic increases from the concurrent construction stage traffic movements will occur on Stony Crossing Road, between Yanga Way and Swan Hill, where a potential traffic increase of +43% compared to the 2017 baseline daily traffic volume is predicted. An increase on +41% is predicted on Yanga Way, which will be utilised by each of the three developments. Moderate daily traffic increases would also be experienced at other assessed locations.

At the assessed locations in Table 6.26, on roads other than the Sturt Highway, the proportional daily traffic increases will be noticeable and will have some effects on the future traffic operations for traffic using these routes if the combined construction activity for these projects is occurring concurrently. However, the assessment is considered to be conservative, and it is unlikely that construction of all three developments would occur simultaneously and for the full duration of the respective construction periods.

The traffic impact assessment (Appendix H) concluded that additional traffic generated by the concurrent construction of the two developments will not cause the future daily traffic volumes on the existing road network to increase above the relevant design levels that would trigger road widening improvements.

**d. Noise**

As part of the noise and vibration impact assessment (Appendix G), it was noted that the construction works for the Sunraysia Solar Farm have potential to occur at the same time as construction works for the project. The modelling results presented in Appendix G and summarised in Section 6.7, indicate that the proposed construction works for the project satisfy the NMLs at all assessment locations. Using the predictions for construction noise levels within the noise assessment report for the Sunraysia Solar Farm (Renzo Tonin 2016), the total cumulative noise level from the concurrent construction of the two developments would still satisfy the NMLs at the identified assessment locations.



The concurrent construction of the two developments would also result in cumulative road traffic movements. Within the noise assessment report for the Sunraysia Solar Farm (Renzo Tonin 2016), road traffic noise generated during the construction stage of the project is predicted to be 51 dB LAeq (15-hour) at the nearest sensitive receptor, which would satisfy the 60 dB LAeq (15-hour) criterion. As part of the noise and vibration impact assessment for the project (Appendix G), a conservative approach was taken for the assessment of road traffic noise and future predicted traffic levels for the project. Traffic generated by the proposed developments is not expected to result in any noticeable increase in average road traffic noise levels at the nearest residential locations north or south of the project (Appendix G). Therefore, it is considered unlikely that traffic generated during the concurrent construction of the two developments would cause a noise impact at sensitive receptors nearest to Yanga Way.

**e. Capacity of the electricity transmission network**

Consultation with Transgrid has confirmed that there is available capacity within the network for the project. Transgrid has published information stating that the ultimate capacity of the Balranald Substation and associated transmission infrastructure is 820 MW subject to various contingency events and constraints that may need to be considered to ensure the safe, effective and reliable operation of the network (Transgrid 2016). Such capacity may require the implementation of secondary system upgrades, “runback” schemes, stability enhancement upgrades, or similar (Transgrid 2016). The combined capacities of the Limondale Sun Farm and the Sunraysia Solar Farm are approximately 450 MW, which is less than the ultimate system capacity as stated by Transgrid.

**f. Additional potential cumulative impacts**

The concurrent construction and operation of the two developments will also result in cumulative impacts to biodiversity and the social and economic environment within the Balranald Shire LGA.

Avoiding and minimising disturbance of native vegetation was a major consideration in the site selection and design process for the two developments. However, as noted in Section 6.2, the project will result in the clearance of approximately 5.32 ha of native vegetation within the site boundary. The construction of the Sunraysia Solar Farm will also require the clearing of native vegetation (approximately 12.11 ha) (NGH Environmental 2017). Therefore, the two developments will result in the removal of a total of 17.13 ha of native vegetation. Biodiversity offset strategies have been developed for the two developments and will be implemented to offset the impacts from the project and the Sunraysia Solar Farm, respectively.

The temporary influx of workers during the potential concurrent construction of the two developments may place pressure on local short-term accommodation and other services within the township of Balranald. This could have adverse flow-on effects on local tourism. For example, the two developments may restrict the availability of supply of short-term accommodation to other users during peak demand periods such as weekends coinciding with any of the region’s major festivals and annual events.

**iii goFARM**

The concurrent construction and operation of the project and goFARM’s expanded agricultural operations may result in cumulative impacts to the social and economic environment within the Balranald Shire LGA, as well as traffic impacts due to increased traffic movements on the local and regional road network.

During consultation with goFARM, OVERLAND were advised that, if approved, approximately 70 people would be involved with the construction of the temporary accommodation camp and the development of the expanded agricultural operations (refer to Section 5.3).



During construction of the temporary accommodation camp, the majority of the required workforce would be housed within existing accommodation available on the property. Any additional short-term accommodation requirements would likely be met by existing capacity within Balranald township.

Once constructed, there may be an opportunity for construction workers from the Limondale Sun Farm to utilise goFARM's temporary accommodation camp. OVERLAND will continue to consult with goFARM regarding the proposed construction schedule for the temporary accommodation camp to determine the feasibility of this opportunity. This would reduce any potential adverse flow-on effects from increased pressure on local short-term accommodation and other services within the township of Balranald.

### **6.13.3 Management and mitigation**

To avoid and minimise cumulative impacts, OVERLAND will consult with Sunraysia Solar Farm Two Pty Ltd and goFARM regarding the proposed construction schedule for the Sunraysia Solar Farm and goFARM's expanded agricultural operations and temporary accommodation camp, respectively. OVERLAND will consult with BSC and local stakeholders to provide information about the timing of the project's peak construction period.

### **6.13.4 Conclusion**

OVERLAND has consulted with Sunraysia Solar Farm Two Pty Ltd, the proponent of the proposed Sunraysia Solar Farm, goFARM, the proponent of the expanded agricultural operations and temporary accommodation camp, and Iluka Resources Limited, the proponent of the Balranald Mineral Sands Mine, to discuss a number of matters including the potential cumulative impacts of the projects (refer to Section 5.3).

The implementation of the management and mitigation measures listed in Section 6.13.3 will reduce the potential for cumulative impacts to be encountered during the concurrent construction and operation of the project, goFARM's expanded agricultural operations and temporary accommodation camp and the Sunraysia Solar Farm.



## 7 Summary of mitigation and management

A summary of the management and mitigation measures for the project, including those documented in this EIS and appended technical reports is presented in Table 7.1. These management and mitigation measures will be incorporated into the environmental management strategy and relevant management plans and protocols.

**Table 7.1 Summary of management and mitigation measures**

Key issue	Management and mitigation measures
Biodiversity	<ul style="list-style-type: none"> <li>disturbance will be restricted to the development footprint identified impacting a total of 5.32 ha of native vegetation;</li> <li>installation of appropriate exclusion fencing around trees and vegetation to be retained in, or directly adjacent to, the development footprint;</li> <li>all material stockpiles, vehicle parking and machinery storage will be within cleared areas or areas proposed for clearing, and not in areas of retained native vegetation;</li> <li>a licensed wildlife salvage team will be on-site during vegetation removal to catch and relocate (if appropriate) any wildlife encountered in vegetation or hollow-bearing trees;</li> <li>where practical, all scattered hollow-bearing trees to be removed will be placed in areas of retained vegetation to provide additional fauna habitat;</li> <li>where appropriate native vegetation cleared from the development footprint will be mulched for reuse on the site, to stabilise bare ground;</li> <li>dust suppression measures will be implemented during construction;</li> <li>implementation of temporary stormwater controls during construction will be considered if necessary to ensure that runoff is consistent with existing conditions; and</li> <li>an erosion and sediment control plan in accordance with Managing Urban Stormwater: Soils &amp; Construction (Landcom 2004) will be prepared in consultation with BSC and will be implemented and monitored during the life of the project to minimise impacts; and</li> <li>impacts to native vegetation will require retirement of 158 biodiversity credits.</li> </ul>
Aboriginal heritage	<ul style="list-style-type: none"> <li>Limondale 1, 9 and 11 will be salvaged prior to construction;</li> <li>further assessment of AHIMS sites 47-6-0605 and 47-6-0606 within the transmission line corridor will be completed prior to construction, in the form of sub-surface testing;</li> <li>consultation with the RAPs will continue in regards to the management of Aboriginal cultural heritage sites within the site boundary throughout the life of the project in keeping with the Aboriginal cultural heritage consultation requirements for proponents 2010 (DECCW 2010);</li> <li>should any unanticipated Aboriginal objects be encountered during works associated with this project, works will cease in the vicinity and the find will not be moved until assessed by a qualified archaeologist;</li> <li>should unanticipated relics be discovered during the course of the project, work in the vicinity will cease and an archaeologist will be contacted to make a preliminary assessment of the find. The Heritage Council will be notified if the find is assessed as a relic; and</li> <li>if any suspected human remains are discovered during any activity the following will occur:               <ul style="list-style-type: none"> <li>all work will immediately cease at that location and remains will not be further moved or disturbed;</li> <li>the NSW Police and OEH's Environmental Line (131 555) will be notified of the details of the remains and their location as soon as practicable;</li> <li>work will not recommence at that location unless authorised in writing by OEH; and</li> <li>if the human remains are likely to be Aboriginal in origin, the find will be reported to the RAPs and OEH. If the find is likely to be non-Aboriginal in origin and more than 100 years in age, the Heritage Council of NSW will be notified of the find under s.146 of the Heritage Act.</li> </ul> </li> </ul>
Historic heritage	<ul style="list-style-type: none"> <li>an unexpected finds protocol will be followed if unexpected historical archaeology is discovered during construction of the project; and</li> <li>if unexpected historical archaeology is discovered during construction, work in the immediate area will cease and an archaeologist will be contacted to make a preliminary assessment of the find. If it is determined to be a relic under the Heritage Act, further investigation may be required and the Heritage Council may need to be notified.</li> </ul>



**Table 7.1 Summary of management and mitigation measures**

Key issue	Management and mitigation measures
Land	<ul style="list-style-type: none"> <li>• a site access protocol will be developed that lists the relevant landholder contact details and includes measures to minimise adverse impacts, such as, driving carefully to minimise disturbance to livestock, crops and pastures;</li> <li>• the timing of construction and the location/design of temporary access routes (Figure 3.1) will be positioned to minimise impacts on neighbouring agricultural operations;</li> <li>• access tracks to and from the site will remain accessible to the landholder to avoid any impacts to the operation and sustainability of neighbouring agricultural businesses;</li> <li>• soil resources will be managed to ensure the future viability of the site for agricultural production, including:               <ul style="list-style-type: none"> <li>– optimisation and recovery of useable topsoil and subsoil;</li> <li>– establishment of effective soil amelioration procedures; and</li> <li>– separate storage of topsoil and subsoil to ensure that soil is replaced in the right order and to avoid unnecessary impacts on soil and existing vegetation structure;</li> </ul> </li> <li>• an erosion and sediment control plan in accordance with Managing Urban Stormwater: Soils &amp; Construction (Landcom 2004) will be prepared in consultation with BSC and will be implemented and monitored during the life of the project to minimise impacts;</li> <li>• the EMP will include weed management protocols and will consider BSC’s Noxious Weeds Policy (BSC 2005). Weed management protocols will include measures for the identification, management and ongoing monitoring of weeds on the site;</li> <li>• the EMP will include a spill response plan which will be implemented during construction and throughout the project’s operational stage to avoid potential for contamination;</li> <li>• vehicle movements will be restricted to the formed access tracks;</li> <li>• during decommissioning, all above ground facilities will be removed from the site;</li> <li>• during decommissioning underground electrical collection systems will be left in situ in order to avoid unnecessary ground disturbance; and</li> <li>• a site decommissioning plan will be prepared following the completion of project construction and commissioning and will feature rehabilitation objectives and strategies for returning the site to agricultural production.</li> </ul>
Visual	<ul style="list-style-type: none"> <li>• suitable colours will be chosen for project infrastructure to minimise visual impacts;</li> <li>• buildings and materials will be designed to be consistent with the local farming landscape and will be similar to existing farm buildings located in the surrounding area;</li> <li>• all night lighting will be motion activated and comply with Australian Standard AS4282 (INT) 1997 – Control of Obtrusive Effects of Outdoor Lighting; and</li> <li>• the panel designs considered for the project, feature anti-reflective surface treatment.</li> </ul>
Noise and vibration	No mitigation measures proposed.
Traffic and transport	<ul style="list-style-type: none"> <li>• a new intersection is proposed for site access, approximately 150 m south of the intersection between Yanga Way and Balranald Road;</li> <li>• OVERLAND will be required to lodge a Section 138 Certificate (Work on Public Lands) for RMS approval prior to road work for the site access intersection construction; and</li> <li>• an EMP will be prepared for the construction of the proposed site access intersection.</li> </ul>



**Table 7.1 Summary of management and mitigation measures**

Key issue	Management and mitigation measures
Water	<ul style="list-style-type: none"> <li>• project infrastructure will be positioned to minimise the potential obstruction of the surface water flows and stormwater runoff to minimise the possibility of surface water flooding within the development footprint;</li> <li>• an erosion and sediment control plan in accordance with Managing Urban Stormwater: Soils &amp; Construction (Landcom 2004) will be prepared in consultation with BSC and will be implemented and monitored during the life of the project to minimise impacts. This plan will include provisions to:               <ul style="list-style-type: none"> <li>– install erosion and sediment controls (if required) prior to and during construction;</li> <li>– regularly inspect erosion and sediment controls, particularly following large rainfall/wind events;</li> <li>– ensure that all vehicles, plant and equipment leaves the site in a clean condition to avoid tracking of sediment on Yanga Way;</li> <li>– during excavation, separate topsoils and subsoils to ensure that they are replaced in their natural configuration;</li> <li>– stockpile topsoil appropriately to minimise weed infestation and maintain soil organic matter, soil structure and microbial activity; and</li> <li>– minimise the total area of disturbance from excavation and compaction.</li> </ul> </li> </ul>
Hazards	<ul style="list-style-type: none"> <li>• all project infrastructure will be designed in accordance with relevant industry standards;</li> <li>• all relevant procedures in relation to a high voltage installation will be adhered to throughout the life of the project;</li> <li>• APZs will be provided and managed to enable fire fighting vehicle access and to distance vulnerable structures from vegetation which represents a fire hazard; and</li> <li>• the risk of the project initiating a bushfire will be minimised through the implementation of appropriate management measures.</li> </ul>
Air quality	<ul style="list-style-type: none"> <li>• use of a water truck(s) during construction for dust suppression along internal, unsealed access roads and disturbed areas;</li> <li>• vehicle movements will be minimised where possible;</li> <li>• all vehicles, plant and equipment will be cleaned and washed regularly;</li> <li>• all vehicles, plant and equipment will be switched off when not in continuous use;</li> <li>• all vehicles, plant and equipment will be regularly inspected and maintained to ensure that they are operating efficiently;</li> <li>• regular maintenance of unsealed access roads will be undertaken to minimise wheel generated dust;</li> <li>• a 50 m section from the site access road to the intersection of Yanga Way will be sealed to prevent the transport of soil and dust to the surrounding road network; and</li> <li>• dust suppression requirements during construction will take into consideration weather and the likelihood of extended dry periods which could exacerbate impacts.</li> </ul>
Socio-economic	<ul style="list-style-type: none"> <li>• a preference for local employment wherever possible;</li> <li>• a preference for use of local businesses such as motels, motor inns, restaurants and service providers wherever possible;</li> <li>• consideration of demand on local short-term accommodation demand and potential conflicts with the region's major festivals and annual events; and</li> <li>• provision of information to the community about the timing of project construction period and need for employees and services from local business and services.</li> </ul>
Cumulative	<ul style="list-style-type: none"> <li>• to avoid and minimise cumulative impacts, OVERLAND will consult with Sunraysia Solar Farm Two Pty Ltd and goFARM regarding the proposed construction schedule for the Sunraysia Solar Farm and goFARM's expanded agricultural operations and temporary accommodation camp, respectively;</li> <li>• OVERLAND will consult with BSC and local stakeholders to provide information about the timing of the project's peak construction period.</li> </ul>





## **8 Conclusion and justification**

### **8.1 Introduction**

The SEARs require the EIS to address the reasons why the development should be approved having regard to the biophysical, economic and social costs and benefits of the development. This justification is summarised below with reference to the outcomes of the impacts of the project presented in Chapter 6. The strategic justification for the project is presented in Section 1.3, and an analysis of site suitability is presented in Section 3.2.

This chapter also considers the other relevant requirements under Schedule 2 of the EP&A Regulation not already addressed in the EIS, specifically the objects of the EP&A Act.

### **8.2 Biophysical, social and economic justification**

#### **8.2.1 Biophysical**

The biophysical aspects of the project are assessed in Chapter 6. Biophysical impacts of the project include:

- Biodiversity – removal of 5.32 ha of native vegetation within the development footprint, none of which is listed as a threatened ecological community (TEC) or EEC, and other indirect biodiversity impacts (including impacts to viability of retained vegetation, encroachment of weeds and temporary noise impacts). The project has been designed to avoid and minimise impacts to biodiversity. To compensate for unavoidable disturbance of native vegetation, biodiversity offsets are proposed.
- Aboriginal cultural heritage – impacts to three Aboriginal cultural sites, one of low significance and two of moderate significance. Salvage is proposed for the three sites that have not been able to be avoided.
- Land – change of land use for 1,103 ha of the site, the majority of which is currently used for agricultural purposes, and which would be removed from agricultural production for the life of the project (in the order of 30 years). This constitutes 1,072 ha of LSC Class 6 and 31 ha of LSC Class 4 land. Land management practises will avoid or minimise impacts with adjoining land uses, and ensure that the site is not precluded from being returned to a productive agricultural use at the end of operation.

Impacts to all other aspects were predicted to meet relevant criteria and/or be negligible as a result of the project. Through the site selection and project design process, described in Section 3.2, the project has avoided and minimised impacts to the biophysical environment as far as practicable.

#### **8.2.2 Economic**

Economic impacts of the project are detailed in Section 6.12. The project is justified economically due to the economic benefits and stimulus it would provide to the local region.

Construction of the project will require an average workforce of 90 people, with up to 200 people during the peak of construction. In the order of seven full time equivalent people will be employed during operation.

The project is consistent with the strategic objectives of the NSW Government in terms of renewable energy generation, and will provide economic stimulus to the local region.



### **8.2.3 Social**

The project is justified on social grounds for three principal reasons; it is broadly supported by the local and regional community (refer to Section 5.3), it will contribute to the local and regional economies (refer to Section 6.12), and provide indirect benefits through the use of services and facilities both locally and regionally.

## **8.3 Objects of the EP&A Act**

The project's consistency with the relevant objects of the EP&A Act is considered below. However, the overall conclusion is that the project is consistent with the objects of the EP&A Act either wholly or in the majority.

### **8.3.1 Proper management, development and conservation of resources**

- (a) to encourage:
  - (i) the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,

Resources within the project site include land that is being used opportunistically for agricultural production (albeit with a majority of the development footprint being LSC Class 6 with severe limitations), and land which has biodiversity and cultural heritage values. This constitutes the 'natural resources', which must be properly managed, developed or conserved.

As stated previously, the development footprint will be removed from agricultural use, however land management practises will avoid or minimise impacts with adjoining land uses, and ensure that land is not precluded from being returned to a productive agricultural use at the end of operation.

The biodiversity values and cultural resources in the project site will be mitigated or offset.

For the reasons given above the project will maintain 'social and economic welfare' and achieve 'a better environment'.

### **8.3.2 Orderly development**

- (a) to encourage:
  - ...(ii) the promotion and co-ordination of the orderly and economic use and development of land,

The project provides an opportunity for orderly and economic use land with benefits to the local region. The project's planning and design process, including site selection (see Section 3.2) has taken into account all potential impacts and incorporates measures to avoid, minimise or compensate for these impacts. Thus, it will be an orderly development.



### **8.3.3 Communication and utility services**

- (a) to encourage:
  - ...(iii) the protection, provision and co-ordination of communication and utility services,

The project involves the utilisation of an existing transmission line easement for the project's connection infrastructure. The existing utility services within the easement will not be affected. This represents an orderly and coordinated approach to utility connections, and importantly will avoid impacts to biodiversity and Aboriginal heritage values within the adjacent TSR. The project will not affect any other communication and utility services.

### **8.3.4 Land for public purposes**

- (a) to encourage:
  - ...(iv) the provision of land for public purposes,

The project involves utilisation of an existing access road within the TSR, and connection infrastructure via an existing easement within the TSR. Land within the TSR is available for public purposes. The existing access road would be subject to a greater level of utilisation during the construction period, however consultation with LLS has confirmed that its use can be managed to avoid impacts to public uses within the TSR. The connection infrastructure to the Balranald Substation will be within an existing transmission line easement through the TSR, therefore impacts to land for public purposes due to this infrastructure are considered to be minimised to the greatest extent practicable.

### **8.3.5 Community services and facilities**

- (a) to encourage:
  - ...(v) the provision and co-ordination of community services and facilities, and

The project is likely to utilise existing community services and facilities. The greatest impact would occur during construction when the workforce requirements are at their peak; the socio-economic assessment provided in Section 6.12 indicates that there is current capacity for this demand. It may also help support services and facilities affected with recent measured population decline.

### **8.3.6 Protection of the environment**

- (a) to encourage:
  - ...(vi) the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats, and

The project has sought to minimise impacts on native vegetation due to the project as far as practicable, while establishing offsets would enhance biodiversity values in the medium to short term.



### 8.3.7 Ecologically sustainable development

- (a) to encourage:
  - ...(vii) ecologically sustainable development, and

The principles of ESD, for the purposes of the EP&A Act, are provided in clause 7(4) of Schedule 2 of the EP&A Regulation. It states:

The principles of ecologically sustainable development are as follows:

- (a) the precautionary principle, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:
  - (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and
  - (ii) an assessment of the risk-weighted consequences of various options,
- (b) inter-generational equity, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,
- (c) conservation of biological diversity and ecological integrity, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,
- (d) improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and services, such as:
  - (i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,
  - (ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,
  - (iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

The four principles of ESD and the project's compatibility with each are considered below.

In addition, the Commonwealth's *National Strategy for Ecologically Sustainable Development* defines ESD as 'using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased'.

Conservation of ecological resources will be achieved through avoiding valuable areas (as far as practicable), while progressive rehabilitation and establishing offsets would enhance biodiversity.



### **i Precautionary principle**

This means that if there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. This EIS, prepared by experts in their respective fields, has identified and assessed the potential environmental impacts, and appropriate mitigation and management measures have been developed in response. Taking these measures into account, it is considered that there will be no threat of serious or irreversible damage to the environment as a result of the project.

### **ii Inter-generational equity**

Inter-generational equity is the concept that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations, while intra-generational equity is applied within the same generation.

The project incorporates a range of design, mitigation and management measures to minimise potential impacts on the environment. These measures aim to maintain the environmental conditions within and surrounding the project such that detrimental impacts do not affect the future health, diversity and productivity of the environment.

### **iii Conservation of biological diversity and maintenance of ecological integrity**

Through design, the project has actively sought to minimise impacts to biodiversity, and through the provision of biodiversity offsets, will increase the area of land conserved for biodiversity protection through the provision of biodiversity offsets. Therefore, the project will conserve biological diversity and maintain ecological integrity.

### **iv Improved valuation and pricing of environmental resources**

One of the common broad underlying goals or concepts of ESD is economic efficiency, including improved valuation and pricing of environmental resources.

In the past, it was assumed that some environmental resources were free or underpriced, leading to their wasteful use and consequent degradation. Consideration of economic efficiency, with improved valuation of environmental resources, aims to overcome the underpricing of natural resources and has the effect of integrating economic and environment considerations in decision making, as required by ESD.

As previously stated, the project incorporates a range of design, mitigation and management measures to minimise potential impacts on the environment. These costs associated with these measures are incorporated into the capital investment and operating costs of the project.

Having considered all aspects of ESD, the conclusion is that the project is consistent with the object and with its specific components.

### **8.3.8 Increased public involvement**

- (c) to provide increased opportunity for public involvement and participation in environmental planning and assessment.



Community consultation has been completed during the preparation of the EIS, and OVERLAND has actively sought to involve the community in the planning and assessment process (refer to Chapter 5). The engagement activities undertaken included two community information sessions, phone calls, meetings and informal discussions, thus providing opportunity for public involvement and participation in environmental planning and assessment.

## 8.4 Conclusion

There is a sound justification for the project, founded on the following:

- The site is suitably located:
  - in a region with ideal climatic conditions for large-scale solar energy generation, with ideal physical conditions;
  - within 500 m of infrastructure with adequate capacity to receive the energy proposed to be generated; and
  - proximate to land uses compatible with large-scale solar energy generation at a capacity which matches the availability of the network.
- The project will not result in significant biophysical, social or economic impacts, and the project design has actively sought to avoid and minimise impacts, in particular to biodiversity, heritage, land use and visual amenity, through the siting and design of project infrastructure.
- The project will generate direct and indirect economic benefits, through the creation of employment opportunities and benefits to the local economy through income and expenditure during the life of the project.
- The production of renewable energy directly aligns with the objectives of the State's renewable energy targets and the objectives of the NSW Government's REAP, and will contribute to increased energy security through valuable contributions to a more diverse energy mix.

A suite of design, mitigation and management measures are proposed in this EIS to avoid, minimise and manage impacts of the project. The project will enable the orderly and logical use of natural, physical and human resources existing in the area and region. There will be economic investment and employment benefits for the local region and a realised opportunity for renewable energy generation, while minimising potential environmental and social impacts.

The overall benefits of the project are considered to be in the public interest.



## Abbreviations

ACHAR	Aboriginal cultural heritage assessment report
AEMO	Australian Energy Market Operator
AHIMS	Aboriginal Heritage Information Management System
APZ	asset protection zone
ARI	average recurrence interval
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ASC	Australian Soil Classification
AWS	Automatic Weather Station
Balranald LEP	Balranald Local Environmental Plan 2010
BAR	biodiversity assessment report
BCA	Building Code of Australia
BLALC	Balranald Local Aboriginal Land Council
BSC	Balranald Shire Council
BoM	Bureau of Meteorology
BSAL	Biophysical Strategic Agricultural Land
CASA	Civil Aviation Safety Authority
CL Act	<i>NSW Crown Land Act 1989</i>
DA	development application
DoE	Commonwealth Department of Employment
DoEE	Commonwealth Department of the Environment and Energy
Dol-DRE	NSW Department of Industry - Division of Resources and Energy
Dol-Lands	NSW Department of Industry - Lands
DP&E	NSW Department of Planning and Environment
DPI	NSW Department of Primary Industries
EEC	endangered ecological community
EIS	environmental impact statement
EL	exploration licence



ELF	extremely low frequency
EMM	EMM Consulting Pty Limited
EMP	environmental management plan
EMFs	electric and magnetic fields
EP&A Act	NSW <i>Environmental Planning and Assessment Act 1979</i>
EP&A Regulation	NSW Environmental Planning and Assessment Regulation 2000
EPA	NSW Environment Protection Authority
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPL	environment protection licence
ESD	ecologically sustainable development
FBA	Framework for Biodiversity Assessment
FDI	fire danger index
G	gauss
GDEs	groundwater dependent ecosystems
goFARM	goFARM Australia Pty Ltd
GWh	gigawatt hours
ha	hectare
Heritage Act	NSW <i>Heritage Act 1977</i>
Hz	hertz
IBRA	Interim Biogeographic Regionalisation for Australia
ICNG	Interim Construction Noise Guideline
ICNIRP	International Commission on Non-Ionizing Radiation Protection
ICOMOS	Australia International Council on Monuments and Sites
IEEE	Institute of Electrical and Electronic Engineers
Infrastructure SEPP	State Environmental Planning Policy (Infrastructure) 2007
INP	Industrial Noise Policy
IPA	inner protection area
km	kilometre
kW	kilowatt



LGA	local government area
LLS	Local Land Services
LLS-Western	Local Land Services - Western Region
LSC	Land and Soil Capability
m <sup>2</sup>	square metres
mG	milligauss
mm	millimetres
MNES	matters of national environmental significance
MRC	Murray River Council
MW	megawatt
NAASRA	National Association of Australian State Road Authorities
NMLs	noise management levels
NNTT	National Native Title Tribunal
NPI	National Pollution Inventory
NPW Act	NSW <i>National Parks and Wildlife Act 1974</i>
NPWS	National Parks and Wildlife Service
NSW	New South Wales
NSW LPI	NSW Land and Property Information
NTSCORP Limited	NSW Native Title Services Corporation Limited
NV Act	NSW <i>Native Vegetation Act 2003</i>
OEH	NSW Office of Environment and Heritage
OVERLAND	Overland Sun Farming Pty Limited
PAC	Planning Assessment Commission
PADs	potential archaeological deposits
PBP	Planning for Bushfire Protection
PCT	plant community type
PHA	preliminary hazard assessment
POEO Act	NSW <i>Protection of the Environment Operations Act 1997</i>
PV	photovoltaic



PVP	property vegetation plan
RAPs	registered Aboriginal parties
RBL	rating background noise level
REAP	Renewable Energy Action Plan
RF Act	<i>NSW Rural Fires Act 1997</i>
RMS	NSW Roads and Maritime Services
RNP	Road Noise Policy
RTS	response to submissions
Rural Lands SEPP	State Environmental Planning Policy (Rural Lands) 2008
SEARs	Secretary's environmental assessment requirements
SEED	Sharing and Enabling Environmental Data
SEPP 33	State Environmental Planning Policy No 33 - Hazardous and Offensive Development
SEPP 55	State Environmental Planning Policy No 55 - Remediation of Land
SHR	State Heritage Register
SRD SEPP	State Environmental Planning Policy (State and Regional Development) 2011
SRLUP	NSW Strategic Regional Land Use Policy
SSD	State significant development
T	tesla
TDS	total dissolved solids
TEC	threatened ecological community
TfNSW	Transport for NSW
TSR	travelling stock reserve
TSC Act	<i>NSW Threatened Species Conservation Act 1995</i>
VIS	Vegetation Information System
Wakool LEP	Wakool Local Environmental Plan 2013
WM Act	<i>NSW Water Management Act 2000</i>
WSC	Wakool Shire Council
μT	microtesla



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